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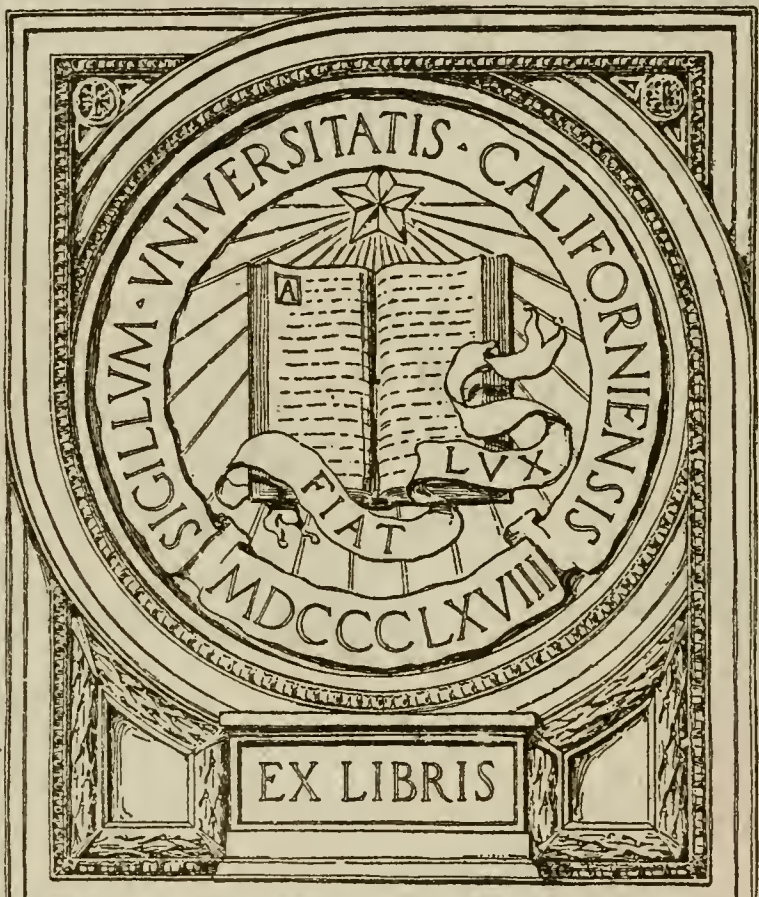
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WORKS OF Prof. E. A. RUDDIMAN

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Incompatibilities in Prescriptions.

For Students in Pharmacy and Medicine, and Practising Pharmacists and Physicians. Third Edition, Partly Rewritten. 8vo, vi + 312 pages. Cloth, $2.00.

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WHYS IN PHARMACY

A COMPILATION OF REASONS UNDERLYING THE PRINCIPLES OF PHARMACY, SUPPLEMENTED BY A TABLE OF EQUATIONS

BY

EDSEL A. RUDDIMAN, PH.M., M.D.

Professor of Pharmacy and Materia Medica in Vanderbilt University
Author of "Incompatibilities in Prescriptions"

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EDSEL A. RUDDIMAN

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PREFACE.

In the publication of these questions and answers the writer claims no originality. The only reason he has for putting them into book form is because he has had numerous requests for them from his students and the readers of the Bulletin of Pharmacy in which much of the matter has been printed.

Early in the course of the author's teaching he came to the conclusion that the teaching of the reasons for the use of certain ingredients and for mixing these in certain orders is one of the most important parts of the work—more essential than the memorizing of formulas. The book is not intended as a quiz compend, but as an aid to those who wish to get at the principles underlying the subject. At first only the questions were written, leaving the student to look up the answers for himself. Mr. Joseph Helfman, editor of the Bulletin of Pharmacy, suggested that

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more good would be done the readers by giving the answers as well, and the writer came to the same conclusion.

Acknowledgment is made of the free use of Caspari's Treatise on Pharmacy and other books on pharmacy and chemistry.

EDSEL A. RUDDIMAN.

NASHVILLE, October, 1905.

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WHYS IN PHARMACY.

PREPARATIONS.

WATERS.

Why is purified talc used in making many official waters? Because it breaks the volatile substances into minute particles, thereby increasing the surface exposed to the solvent action of the water; and it also removes the excess of the volatile substances, making a clear solution. At the same time, talc is not appreciably soluble in water.

Why is calcium phosphate of the 1890 method objectionable? It is slightly soluble, particularly in the presence of acid substances, and many waters made with it seem to be good media for the growth of micro-organisms.

Why is magnesium carbonate an objectionable substitute for purified talc? The commercial article contains some hydrate which is somewhat soluble in water, making a solution that is sufficiently alkaline to cause the formation of a precipitate when any one

of a number of metallic or alkaloidal salts is added to the water. Moreover, magnesium carbonate combines with acids that are normally present in some of the oils, forming soluble compounds which may give colored preparations.

Why is the 1880 method of using cotton objectionable? Because it does not divide the oil into such fine globules, it takes more time, more oil is wasted, and sometimes oil globules are washed into the filtrate.

Why is a jug better than a bottle in making flavoring waters by mixing oil with hot water? The rough surface of the jug helps to break up the oil.

Why are waters made by distillation frequently of finer flavor than when made by solution of oil? Acids and ethers present in some plants pass over with the oil and modify the odor.

Why is the addition of alcohol as a preservative objectionable? A small amount helps rather than hinders decomposition, while a large amount is objectionable on account of its therapeutic action.

Why is a plug of cotton put into the neck of the stock-bottle when a distilled or flavoring water is removed by siphoning? As the water is drawn off air enters the bottle and must pass through the cotton which filters out dust and germs, protecting the water from the growth of microscopic organisms.

Why is it objectionable to use water that has not been distilled for making preparations or filling prescriptions? Ordinary water may contain ammonia,

carbon dioxide, inorganic salts, organic matter, and bacteria.

Why is the hardness of water called "temporary hardness" when it is due to calcium carbonate in solution? The calcium carbonate is held in solution by carbon dioxide and boiling drives this off and precipitates the salt, making the water soft.

Why does the U. S. P. direct that the first 100 cc. of distillate be thrown away in making distilled water? Because it holds in solution practically all of the gases that were held in solution in the 1000 cc. before distillation.

Why are the last 100 cc. left in the retort in making distilled water? If distillation were carried too far some inorganic matter might be carried over mechanically, or some of the organic matter decomposed and volatilized, or injury might result to the retort.

Why should the container for distilled water be rinsed with hot distilled water just before being filled? To wash out impurities and destroy all germs.

Why is condensed steam from boiler-pipes an objectionable substitute for distilled water? It is generally contaminated with oil from the boiler and iron from the pipes.

Why is ammonia water sometimes marked "FFF" or "FFFF"? This refers to the strength, but the samples marked the same vary considerably. "F" stands for fortis, strong, "FFF" for triple strength.

Why should stronger ammonia water be kept in

"partially" filled bottles? The gas is readily given up by the water and the pressure might easily become so great as to burst the bottle.

Why is talc not used in making bitter almond water? Oil of bitter almonds is sufficiently soluble in water so that a clear solution results when the desired amount of oil is used.

Why is natural oil sometimes preferable to the artificial oil of bitter almonds? The artificial oil does not contain hydrocyanic acid, which is the sedative principle.

Why should stronger orange flower water be kept in loosely-stoppered bottles? If kept tightly stoppered it acquires a disagreeable foreign odor, which may be dissipated by exposure to air.

Why is alcohol used in making camphor water? To dissolve the camphor so that it can be more thoroughly distributed through the talc.

Why is the greater part of the alcohol allowed to evaporate spontaneously? If the alcohol were not evaporated the water would be more than saturated. If heat were used to evaporate it some camphor would be volatilized.

Why should manganese dioxide not be too fine or hydrochloric acid too concentrated in making chlorine water (1890)? In either case the generation of gas at first would be too fast.

Why should chlorine water be kept in a cool, dark place? Heat volatilizes the chlorine and light changes it, forming hydrochloric acid.

Why should an excess of chloroform be kept in the container of chloroform water? So as to keep a saturated solution at all times, chloroform being very volatile.

Why should chloroform water be kept in an amber-colored bottle? Light decomposes it, forming hydrochloric acid.

Why is barium dioxide hydrated and kept cold in making hydrogen dioxide water (1890)? Cold aids hydration and hydration causes a larger yield.

Why is phosphoric acid used in preference to other acids in making hydrogen dioxide water? Experience shows that phosphoric acid gives a rather larger yield.

Why is a small amount of acid left in hydrogen dioxide water? The acid tends to prevent decomposition of hydrogen dioxide.

Why should hydrogen dioxide water be kept in loosely stoppered containers? Because it slowly decomposes, liberating oxygen, and sufficient pressure may be produced to burst the bottle. Keeping the bottle tightly stoppered does not seem to retard decomposition, but keeping in the dark does.

CERATES.

Why in making cerates is it best to melt the ingredient having the highest melting-point first and then the one having the next highest melting-point? If they are all heated together the one having the

lowest melting-point may be decomposed by the temperature necessary to melt the one having the highest melting-point.

Why are the melted ingredients stirred constantly until cold in making simple cerate? To prevent separation, wax solidifying first would tend to separate.

Why is liquid petrolatum used in making cerate of cantharides? By macerating cantharides with liquid petrolatum the cantharidin is more completely dissolved by the base. This preparation does not now have the odor of turpentine as did that of the 1890 edition.

Why is wool-fat used in making cerate of lead subacetate? It aids the mixing of the aqueous solution.

Why are paraffin, petrolatum, and camphor used in place of camphor cerate in making cerate of lead subacetate? Made with these the cerate keeps better. The cerate made by the 1890 formula soon turns yellow and rancid.

Why does the U. S. P. direct that resin cerate be cooled with occasional stirring? Continuous stirring incorporates some air and is not necessary as the cerate cools to a homogeneous mass without it.

PAPERS.

Why is the fixed oil removed from mustard in making mustard paper? The fixed oil is inert and makes the paper greasy and unsightly.

Why should mustard paper be dipped into warm water just before applying? Water is necessary to allow the ferment to act on the sinigrin, forming the volatile oil of mustard. Water also softens the paper. Hot water must not be used because it destroys the activity of the ferment and prevents the formation of the volatile oil.

COLLODIONS.

Why should the neck of a collodion bottle be thoroughly wiped out after pouring out some of the collodion? If the stopper is inserted without this wiping it is likely to get fixed in so tightly that it is necessary to break the bottle the next time collodion is wanted.

Why is alcohol used in making collodion? Ether alone does not dissolve guncotton as readily as when it contains a little alcohol.

Why is cantharides exhausted with chloroform instead of with collodion in making cantharidal collodion? Chloroform leaves a residue which makes a nearly clear solution with collodion. Collodion is so thick that it cannot be readily separated from the insoluble part of the flies if it were used as the macerating fluid. Ether is probably as good as chloroform.

Why is plain collodion better than flexible collodion for putting on small cuts? Plain collodion contracts more than the flexible and draws the lips of the wound together more.

DECOCTIONS.

Why should decoctions not be made by dilution of fluid extracts? Water does not dissolve the same principles that are generally in solution in the fluid extract, and consequently the therapeutic action is not the same.

Why in making decoctions are drugs put into cold water instead of hot water as in infusions? Drugs suitable for decoctions more often contain albuminous matter, which if coagulated at first by hot water would make the extraction of the active principles more difficult.

Why should hard or prolonged boiling be avoided? The active principle may be decomposed or the decoction loaded with tannin and inert matter.

Why should decoctions be strained at 40° C. rather than strained when cold? Hot water sometimes takes out active matter that is precipitated from cold water. By straining when warm this is left in and can be mixed with the liquid.

Why, in making decoction of cetraria (1890), is cetraria macerated in cold water which is subsequently thrown away? Cold water takes out the bitter principle, making the decoction more palatable.

ELIXIRS.

Why is purified talc used in making aromatic elixir? Because the oils in compound spirit of orange are precipitated by the water and syrup.

and an insoluble powder is necessary to remove the excess.

Why should the filter be wetted with a mixture containing at least twenty-five per cent. alcohol instead of wetted with water in filtering aromatic or other elixirs? Water generally gives a turbid filtrate, due to separation of small globules of oil.

Why do some elixirs give a turbidity with a small amount of water but a clear solution with a large amount? Aromatic elixir is a saturated solution of oils which are thrown out of solution by a small amount of water but redissolved by a larger amount.

Why is carmin generally not a good coloring-agent for elixirs? Elixirs are frequently acid and acids precipitate carmin.

Why are ammonia water and acetic acid used in making elixir of iron, quinine, and strychnine phosphates? To make ammonium acetate which tends to prevent the precipitation of the iron phosphate.

Why do elixirs containing the soluble phosphate of iron with quinine sulphate so often precipitate? Frequently the quinine sulphate is slightly acid, or an acid is added to aid the solution of the quinine, and acid precipitates the insoluble phosphate of iron.

Why is potassium citrate used in making elixir of salicylic acid, N. F.? Potassium citrate aids the solution of salicylic acid, possibly forming potassium salicylate and citric acid.

Why is ammonia water used in elixir of ammonium valerate, N. F.? Ammonium valerate, on exposure,

slowly loses ammonia, liberating the insoluble liquid valeric acid; ammonia combines with this.

Why is anethol preferred to oil of anise in elixir of anise, N. F.? It has a finer odor and flavor.

Why is ammonia water used in elixir of bismuth, N. F.? Because the bismuth and ammonium citrate loses ammonia, leaving the insoluble bismuth citrate, and ammonia combines with it to form a soluble compound.

Why is magnesium carbonate used in elixir of buchu, N. F.? On adding the elixir and syrup to the fluid extract of buchu resinous matter is precipitated; magnesium carbonate aids the removal of this.

Why is elixir of cinchona, N. F., allowed to stand as long as possible before filtering? So as to let the fine precipitate which is formed settle as it tends to clog the filter.

Why are citric acid and ammonia water used in making elixir of cinchona, iron, and calcium lactophosphate, N. F.? The ammonium citrate formed prevents the precipitation of iron that might otherwise take place.

Why is talcum used in preference to calcium phosphate in making compound digestive elixir, N. F.? Calcium phosphate would dissolve in the hydrochloric and lactic acids, while purified talcum does not.

Why is powdered pumice-stone used in making aromatic elixir of yerba santa, N. F.? Some kind of

insoluble powder must be used to aid the removal of the precipitated resinous matter from the fluid extract, and it is thought by some that the use of pumice-stone gives a finer flavor to the finished product than does calcium phosphate, possibly by clearing the mixture without removing so much of the flavoring principle.

Why are ammonia water and solution of tersulphate of iron used in making elixir of gentian, N. F.? Ammonia converts the ferric sulphate into the insoluble ferric hydrate, and this combines with tannin in the compound spirit of cardamom to form an insoluble tannate of iron which may be removed by filtration; the elixir can then be dispensed with iron salts.

Why is the elixir of pepsin and bismuth, N. F., of doubtful therapeutic value? Because in getting the bismuth and ammonium citrate into solution a slight excess of ammonia is used, making the solution a little alkaline; and pepsin is said to be rendered entirely inert by alkalies.

PLASTERS.

Why is a plaster made with a rubber base supposed to be less effective than one made with the lead-plaster base? It is claimed that a rubber-base plaster does not give up the medicinal matter as readily as one made with lead plaster.

Why should spread plasters have a quarter to

a half inch of leather or cloth not covered by the mass? The plaster mass often softens with the heat of the body and may ooze out, soiling and sticking to the clothing.

Why are perforated plasters preferred to those not perforated? They are more pliable, and they allow the escape of exhalations of the skin, thus being more comfortable.

Why are oleate of mercury and hydrous wool-fat used in mercurial plaster? To aid the division of metallic mercury used in the plaster.

Why is the reverse side of court plaster (1890) coated with tincture of benzoin? To make it impervious to air and water.

Why is glycerin used in making court plaster (1890)? It makes the gelatin more flexible and prevents its cracking.

Why is water used in making lead plaster(1890)? It enters into chemical reaction and tends to prevent the burning of the organic matter.

Why is lead plaster washed with hot water? To soften the plaster so that the sodium acetate may be more easily washed out.

EMULSIONS.

Why must the mortar be perfectly dry, and the oil free from moisture, when emulsions are made by putting the oil and acacia into the mortar and then adding the water? Because the presence of even a

small amount of water forms a mucilage with some acacia before it is mixed well with the oil, and thus "cracks" the emulsion

Why do emulsions of volatile oils separate more quickly than those of fixed oils? As a rule the emulsion is thinner.

Why are emulsions of the volatile oils and light liquids best made in a bottle while emulsions of fixed oils are made in a mortar? The ingredients in an emulsion of a fixed oil make so thick a liquid that they cannot be quickly and well mixed. The emulsion of a volatile liquid is generally so thin that it can be readily mixed by agitation.

Why are glass or porcelain mortars not so good for making emulsions as Wedgewood? They are too smooth.

Why are powdered gum-resins not as good for making emulsions as the tears or masses? Frequently considerable volatile matter is driven off in the drying which is necessary before powdering.

Why is it not necessary to add an emulsifying agent in making many seed and gum-resin emulsions? Because gummy matter is already present in the drugs.

Why is an emulsion made with acacia whiter than one made with most other emulsifying agents? Because acacia has the property of dividing oil into smaller globules, and the smaller the globules the whiter the emulsion.

Why should pressure with the pestle not be used

in making emulsions in the mortar? Because pressure generates heat, and heat tends to prevent emulsification.

Why is tragacanth sometimes used in connection with acacia in emulsions? Acacia is a good emulsifying agent, while tragacanth is useful to keep the emulsified oil from separating from the aqueous portion after the product is made.

Why is tincture of quillaja objectionable as an emulsifying agent? It has some physiological action of its own.

Why should strongly alcoholic fluids be diluted with water before being mixed with emulsions? Acacia, being insoluble in alcohol, is thrown out of solution, and the emulsion is thus broken.

Why is expressed oil of almonds used in making emulsion of chloroform? Because it is a fixed oil, and fixed oils help to emulsify chloroform and keep it in suspension.

Why, in making emulsion of cod liver oil with hypophosphites, are the syrup and solution of hypophospites added to the primary emulsion instead of being used in making the primary emulsion? Sugar and salts tend to prevent emulsification.

PERCOLATION AND FLUID EXTRACTS.

Why was the term fluidextractum coined and used in the U. S. P.? In order to separate the fluid from the solid extracts.

Why is a slightly conical percolator better than a cylindrical one? Because when a drug swells after being put into the percolator, it has a chance to press upward, and therefore does not become so firmly packed.

Why is a percolator only slightly conical better than one more decidedly so? In a conical percolator the menstruum which passes through the drug near the sides of the vessel passes through only a short column of the drug, soon striking the sides of the percolator and therefore not becoming nearly saturated with the soluble constituents of the drug. In a percolator which is nearly cylindrical the columns of drug are more nearly uniform in length, and the drug is consequently more uniformly exhausted.

Why is a conical percolator desirable when the menstruum is strongly aqueous? Water swells the drug much more than alcohol, and the conical percolator gives the drug a chance to expand.

Why is it desirable to have a percolator with a stop-cock? Because the rate of flow can be much more easily controlled.

Why must tin percolators not be used in making fluid extracts of nux vomica, conium, and sanguinaria? Because the menstruums for these contain acid which would attack the percolator.

Why is the drug dampened before being put into the percolator? The dampened drug can be packed more firmly and uniformly, and the finer particles

of the drug are not so liable to be washed down to the apex of the percolator.

Why is it advisable to allow the drug to stand after dampening before being put into the percolator? Because the drug has a chance to swell, and there is not the liability of its becoming packed so hard in the percolator as to prevent the flow of the menstruum.

Why should the drug be packed in layers and not be put all into the percolator at one time and packed? If all is put in at once it will be packed too tight at the top and not tight enough at the bottom.

Why can a drug be packed firmly when the menstruum is alcohol? Because alcohol does not swell the drug, does not dissolve so much mucilaginous matter, and so does not become so thick and viscid.

Why should the drug at the bottom of the percolator be packed more loosely than that at the top? Because, in cases of certain drugs, when the menstruum has reached the lower portion of the drug it is so loaded with the matter which has been dissolved that it is too thick to run through the drug if it is tightly packed.

Why is it advisable to put a disk of paper or a sieve on the top of the drug in the percolator? Unless something of the kind is used the menstruum, when it is poured on, will wash a cavity in the drug, and this will tend to prevent the menstruum from passing through uniformly.

Why is the drug macerated for forty-eight hours before percolating? This is for the purpose of allowing the menstruum to permeate every particle of the drug and dissolve the active matter.

Why must the drug be kept covered with the menstruum during percolation? If, when fresh menstruum is poured on, the menstruum has been allowed to drain off, it will rush through between the particles of drug without entering them or dissolving the matter contained in them.

Why should percolation proceed slowly? So as to give the menstruum an opportunity to dissolve all of the matter that it will, thus reducing the amount of alcohol used, and the amount of evaporation necessary.

Why is evaporation necessary in making fluid extracts? Because the standard for fluid extracts requires that one cubic centimeter shall represent one gram of the drug, and it is impossible to exhaust the drug without getting more percolate than this; drugs require from two to five times their quantity of menstruum.

Why is the second percolate evaporated down to a soft extract instead of only so far, that with the reserved portion, it will make up the required amount? By the time the evaporation has been carried to the point where the residue will give the required amount with the reserved portion, all of the alcohol has been driven off, leaving an aqueous mixture, and the water of this will cause precipita-

tion when added to the reserved portion; it is necessary therefore to evaporate off the water.

Why does the quantity of the first percolate—the reserved portion—vary with different drugs? Because different drugs yield different quantities of extractive matter when the second percolate is evaporated. When the drug yields a large quantity of extractive matter the quantity of the reserved first percolate is smaller, so that it can be mixed with the residue without getting too large a volume of the finished product.

Why is it important that the first percolate contain most of the active principle? Because the first percolate is not heated, and heat often destroys some of the active principles.

Why is a clear solution not obtained when the residue from the second percolate is mixed with the first percolate? Because some of the extractive matter which is dissolved by the original menstruum is rendered insoluble by heat in evaporating.

Why is it best to keep the temperature of evaporation down to about 50° C.? Because higher heat in the presence of moisture frequently decomposes the active principles.

Why do fluid extracts deposit solid matter after being made? Because if heat has been used the extractive matter that has been changed precipitates slowly; moreover, change in the temperature and light, and the loss of alcohol, cause a deposit of inert matter.

Why does precipitation sometimes take place in a percolate although the same strength of alcoholic menstruum is used throughout? Because the solvent power of the menstruum varies at different stages of the percolation.

Why does the solvent power of the menstruum vary at different stages of the percolation? The menstruum dissolves certain principles out of the drug, and the solution so made dissolves other matter that is not soluble in the original menstruum.

Why is glycerin used as part of the menstruum in making some fluid extracts? Glycerin plays the part of a preservative in some cases and in others it dissolves tannin and keeps it from precipitating subsequently.

Why is glycerin put into the first part of the menstruum only and not in all of the menstruum? Glycerin is non-volatile and cannot be evaporated with the alcohol and water in evaporating the second percolate; consequently the volume of the finished product would be too large.

Why is a fluid extract made by repercolation better than one made by simple percolation? Because it does not precipitate so much and has not been hurt by heat.

Why is repercolation not more used than it is? The objections are that more time is required, and besides some of the processes require the keeping of dilute percolates.

Why is it best to keep fluid extracts in amber-

colored bottles? Light causes decomposition and precipitation. Blue glass does not protect.

Why is the word "Radicis" introduced into the official title of the fluid extract of belladonna? To show that it is made from the root, the extract and tincture being made from the leaves.

Why is acetic acid used in fluid extract of conium? The acid converts the alkaloid coniine into the acetate, which is more stable and less easily volatilized.

Why is acetic acid used in fluid extract of ergot? To make the alkaloids more stable.

Why is ammonia used in fluid extract of licorice? Glycyrrhizin probably occurs as the acid ammonium salt of glycyrrhizic acid. Ammonia converts it into the neutral salt, which is more soluble and sweeter.

Why is glycerin used in the fluid extract of glycyrrhiza? As a preservative (the amount of alcohol being small) and to prevent precipitation. This fluid extract will now mix with water without precipitation.

Why is glycyrrhiza exhausted with boiling water? This is a good solvent for the sweet principle. The concentrated percolate is mixed with alcohol to precipitate albuminous matter. The filtered liquid is evaporated to get rid of most of the alcohol as the finished product only contains about twenty per cent. by volume of official alcohol.

Why is lupulin put into the percolator without dampening? Lupulin is so resinous that when moistened with alcohol it makes a mass difficult to

pack in such a manner that the menstruum will run through.

Why is acetic acid used in fluid extract of nux vomica? It makes the alkaloid more soluble and also helps to soften the drug so that it may be more readily extracted. Digestion softens the drug.

Why are two layers sometimes seen in the fluid extract of nux vomica after standing? Nux vomica contains quite a large amount of oil which is left in the residue after evaporating the second percolate, and which is not dissolved in the first percolate since that is already saturated with oil.

Why is fluid extract of wild cherry made without evaporation? Hydrocyanic acid is the active principle and is readily soluble in water. It is very volatile and there would be none in the residue if evaporation were directed.

Why is magnesium oxide used in making aromatic fluid extract of cascara? It destroys the bitter principle or renders it insoluble. The drug is dried to allow the use of a uniform menstruum.

Why is acetic acid used in fluid extract of bloodroot? It makes the alkaloid more soluble and also prevents the subsequent precipitation of matter.

Why is solution of potassium hydroxide used in fluid extract of senega? It combines with pectin to form a soluble compound and thus prevents the gelatinization which would otherwise take place.

Why is such strong alcohol used in making fluid extract of senega since a more dilute alcohol would

take out the active principle? The stronger menstruum does not take out so much pectin.

Why is sodium hydroxide used in fluid extract of taraxacum? To prevent subsequent precipitation. This fluid extract usually gives a very heavy deposit on standing.

Why is triticum exhausted with boiling water, evaporated, treated with alcohol, and filtered? To get rid of albuminous matter.

EXTRACTS.

Why, in making some extracts, is the menstruum water; and why, in making corresponding fluid extracts, is it a mixture of alcohol and water? Alcohol is necessary as a preservative in fluid extracts even when the active principles are soluble in water. In most solid extracts no preservative is necessary.

Why does an extract made by drying the juice of a fresh drug vary more than that made from a dried drug? The amount of inert matter in the juice varies more than that dissolved by a given menstruum.

Why does the U. S. P. not direct the evaporation to dryness and powdering of all solid extracts? Because the extra amount of heat required would seriously impair the therapeutic value of some of them.

Why do extracts vary in strength? Manufacturers have different ideas as to what is meant by "pilular consistency"; some extracts absorb moisture on

keeping, and others become more dry. Different samples of the drug vary in the amount of active matter and inert matter which may be dissolved. More heat is used by some manufacturers than others.

Why do some unscrupulous manufacturers use a menstruum containing more water than that directed by the U. S. P.? By so doing they save alcohol and at the same time frequently get a larger yield of extract, since water has a greater tendency to dissolve extractive matter.

Why is glycerin used in some extracts? It is used to prevent the extract from becoming hard and tough.

Why is powdered liquorice used in making some extracts? To keep the extract in the form of a powder, many being somewhat hygroscopic.

Why are extracts sometimes better when made by evaporating the fluid extract than by following the U. S. P., 1890, directions? Because the larger portion of the active principles will not have been heated so long.

Why does the U. S. P. direct in making extracts of belladonna, henbane, and physostigma, that the first portion of the percolate be reserved and evaporated after the second percolate is evaporated? The active principles of these drugs are easily decomposed by heat, and the largest portions of them are subjected to less heat by following the directions.

Why is such a large proportion of water used in making extract of aloes? A small amount of water makes a concentrated solution of the soluble con-

stituents, and this solution dissolves the inert resinous matter. By using a large amount of water the solution is too dilute to dissolve the resin.

Why is acetic acid used in extract of colchicum? It renders the alkaloid colchicine more stable and soluble.

Why does the U. S. P. direct colocynth "freed from seeds" in making extract of colocynth? The seeds contain quite a large percentage of fixed oil which, if allowed to go into the extract, would prevent the extract from being dried and powdered.

Why is alcohol used in making compound extract of colocynth? It helps to thin the melted aloes and make it form a more intimate mixture with the other ingredients.

Why are water and hydrochloric acid used in making extract of ergot? To get rid of foreign and inert matter and make an extract that is soluble in water. Sodium carbonate is used to neutralize the acid.

Why is cold water preferable to hot water in making extract of gentian? Cold water dissolves the active principles as well as hot water, while it does not take out so much inert matter.

Why is the aqueous extract of gentian boiled? Boiling coagulates the albuminous matter, which is strained out.

Why are gentian and glycyrrhiza macerated for twenty-four hours after dampening before being put

into percolators in making the extracts of these drugs? Water is the menstruum used and it causes the drugs to swell considerably; by allowing them to swell before putting them into percolators there is less danger of their getting packed too tight.

Why does the U. S. P. introduce the word "Purum" in the title of extract of glycyrrhiza? To distinguish it from the commercial extract, which is not entirely soluble.

Why is ammonia used in the extract of glycyrrhiza? To make the glycyrrhizin more soluble and sweeter.

Why is hematoxylon boiled with water? The astringent principle is not very readily extracted by cold water, but is by boiling water.

Why is acetic acid used in extract of nux vomica? It helps to soften the drug and converts the alkaloids into the soluble acetates. Extracting with acetic acid and water leaves behind the fixed oil which caused the troublesome part of the 1890 method. Alcohol added to the concentrated aqueous extract precipitates inert matter.

Why is the aqueous infusion of quassia boiled and strained? To remove the albuminous matter.

GLYCERITES.

Why should the glycerites be protected from the air? The glycerin present in them is hygroscopic.

Why is a heat of 140° C. directed in making

glycerite of starch? Because a heat much lower than this would not rupture the enveloping membrane of the starch granule.

Why does the U. S. P. direct the heating of glycerin and boric acid until a definite weight is obtained, in making glycerite of boroglycerin? Because when this weight is reached it is known that the water is driven off and the reaction is complete.

Why should glycerite of boroglycerin not be poured into bottles containing even a little rinsing water? Water combines with boroglycerin, forming glycerin and boric acid.

INFUSIONS.

Why is an infusion of a drug sometimes active when the decoction of the same drug is inert? The heat necessary in making the decoction destroys or volatilizes the active principle.

Why is it not admissible to make an infusion by diluting a fluid extract? A fluid extract, being made with an alcoholic menstruum, does not contain the same active principles that would be extracted by water in making the infusion.

Why are infusions generally incompatible with metallic and alkaloid salts? Because they contain tannic acid.

Why is either rain or distilled water better than hard water in making infusions? Because they do

not contain saline salts that sometimes cause precipitation.

Why are earthen vessels best for making infusions? They are less likely to be broken by the heat, and they retain heat longer than most other vessels.

Why should infusions not be macerated too long? Tannin and other objectionable matter will be taken out to a greater extent.

Why is aromatic sulphuric acid used in making the infusion of cinchona, 1890? The acid converts the alkaloids into soluble sulphates, and the aromatics make the preparation more palatable.

Why is alcohol used in infusion of digitalis? As a preservative.

Why must cold water be used in making infusion of wild cherry? Hot water would coagulate the ferment, preventing the formation of the essential oil of almonds, and would also volatilize the oil even if formed.

LINIMENTS.

Why does an old rancid oil make a better liniment when mixed with an alkali than a fresh oil? The free fat acid combines more readily, forming soap which helps to suspend the remainder of the oil. For the same reason oleic acid is now one of the ingredients of ammonia liniment.

Why is alcohol used in ammonia liniment? It is put in to thin the liniment and prevent it from

getting too thick. It will also aid the chemical reaction.

Why does ammonia liniment sometimes become solid? The ammonia, acting on the oil, forms a soap which is the cause of solidification. In lime liniment a solid soap of lime is formed.

Why is powdered or granulated soap preferable to bar soap in making soap liniment? It is more constant in its amount of water. A nearly saturated solution is wanted, and it would be difficult to get that with bar soap without getting an excess.

Why is soap liniment allowed to stand for twenty-four hours before filtering? Soap contains some sodium palmitate, which goes into solution at first, but which afterwards precipitates and is then filtered out.

Why does soap frequently precipitate even when the directions are followed? The liniment is intended to be a nearly saturated solution of soap; sometimes, however, an excess of soap is unintentionally put in through the fact that it contained less water, and this excess is often precipitated by a change in temperature or evaporation of alcohol.

Why, in making chloroform liniment, is there sometimes a separation into two layers? This separation is due to the use of an excess of water or a deficient amount of alcohol in making the soap liniment.

SOLUTIONS.

Why does the U. S. P. recognize the solution of arsenic trioxide as solution of arsenous acid? The trioxide combines with water to form the true acid.

Why is hydrochloric acid used in making solution of arsenous acid? It aids the solution of the arsenic trioxide and does not cause a chemical reaction.

Why was solution of arsenous acid formerly called solution of chloride of arsenic? Because it was thought that chemical reaction ensued in its manufacture, forming the chloride of arsenic.

Why is sodium bicarbonate used in estimating arsenous acid? Because the iodine reacts with arsenous acid in an alkaline solution only. Hydriodic acid is formed and must be neutralized.

Why should only "translucent pieces" of ammonium carbonate be used in making solution of ammonium acetate? Because the opaque pieces contain more ammonium bicarbonate, and the proportion of acetic acid used would therefore have to vary with the amount of bicarbonate present.

Why should solution of ammonium acetate be made up fresh when wanted? The fresh solution contains some carbon dioxide which makes the preparation more palatable, and this is lost on keeping the solution.

Why must the container for solution of ammonium

acetate be not stoppered at once? Because carbon dioxide is formed and might exert sufficient pressure to burst the bottle.

Why does solution of ammonium acetate sometimes give precipitates with metallic and alkaloid salts? The solution is sometimes alkaline, due to an excess of carbonate or to an insufficient amount of acid used.

Why does solution of ammonium acetate, although neutral, have a taste of ammonia? The loosely combined soda of the saliva liberates ammonia.

Why is it that the solution of arsenous and mercuric iodides is clear, when the mercuric iodide is practically insoluble in water? Arsenous iodide is soluble in water and mercuric iodide is soluble in solutions of iodides, generally forming double compounds.

Why does Donovan's solution change color on keeping? Iodine is gradually liberated, giving a red color.

Why, in making lime water, is the water rejected that is put on to the lime during the first half hour? Lime frequently contains sodium carbonate and other impurities that are soluble in water and that are not desired in lime water.

Why is an excess of lime left in the lime-water container? Lime water absorbs carbon dioxide from the air, forming calcium carbonate, which is precipitated; an excess of lime present keeps the water saturated at all times.

Why does heating a good sample of clear lime water produce a turbidity? Because calcium hydrate is less soluble in hot than in cold water.

Why is the mixture of potassium chlorate and hydrochloric acid warmed in a flask plugged with wet cotton in making compound solution of chlorine? Heat aids chemical reaction and the formation of chlorine. The wetted cotton allows the air to escape without losing much chlorine, the water catching it. Water is then passed through the cotton to recover the chlorine. This formula is simpler than that of chlorine water (1890) which it replaces, but it contains other substances.

Why does the U. S. P. direct the use of iron wire in making solution of ferric chloride? Because it is comparatively pure iron.

Why is an excess of iron used in making solutions of ferric chloride? The reaction takes place more readily.

Why is the mixture of iron and hydrochloric acid heated before filtering? So as to bring the reaction to completion, and the salt into solution.

Why is hydrochloric acid added to this filtrate of ferrous chloride? To prevent the formation of any oxychloride; moreover, hydrochloric acid is necessary when the ferrous salt is changed to ferric, since ferric chloride contains a larger proportion of chlorine which must be gotten from the hydrochloric acid.

Why is nitric acid used in making solution of ferric chloride? It oxidizes the ferrous to ferric chloride.

Why is hydrochloric acid added to the solution of

ferric chloride just before making up to the required amount with water? Nearly all the free hydrochloric acid is driven off in getting rid of the nitric acid; and if an excess of hydrochloric acid is not present, oxychloride of iron is precipitated on allowing the solution to stand.

Why is a part of ferric chloride converted into ferric hydroxide, and this dissolved in the remaining solution of ferric chloride, in making solution of dialyzed iron? The solution so obtained contains basic ferric chloride; this does not pass through the filter as does ferric chloride.

Why should the solution of ammonium acetate "not be alkaline" in making solution of iron and ammonium acetate? Because iron would be precipitated as a basic salt.

Why is nitric acid used in making solution of ferric subsulphate? It oxidizes the ferrous to ferric iron.

Why is sulphuric acid used in making Monsel's solution? Because iron in the ferric condition has a larger proportion of sulphuric acid than it has in the ferrous state.

Why is the ferrous sulphate added in portions to the mixture of sulphuric and nitric acids in making Monsel's solution? Because, if added all at once the amount of nitric oxide gas formed would be sufficient to cause the expulsion of some of the liquid.

Why, in making Monsel's solution, is more nitric acid added if, on adding a few drops, red fumes are given off? The formation of red fumes shows that

all of the ferrous sulphate has not been changed to the ferric compound and so more nitric acid is necessary.

Why, in making Monsel's solution, does the liquid become almost black, and then lighter on further heating? Some of the nitric oxide combines with the ferrous sulphate, forming this dark compound, which is afterwards decomposed by the heat.

Why does Monsel's solution separate a solid when mixed with one half its volume of sulphuric acid, while solution of ferric sulphate does not? Because, in the concentrated Monsel's solution, the ferric sulphate is not soluble in the sulphuric acid, Monsel's solution being stronger than the solution of the sulphate of iron.

Why should the solution of ferric subsulphate be kept in a moderately warm place protected from light? When chilled it solidifies and light reduces it.

Why is solution of mercuric nitrate made from the red oxide? The solution is more easily made from it than from the metallic mercury.

Why is potassium iodide used in making compound solution of iodine? Iodine is nearly insoluble in water, but readily soluble in an aqueous solution of an iodide.

Why does solution of magnesium citrate sometimes precipitate on keeping? The normal magnesium citrate is less soluble than the acid citrate and when the excess of citric acid is neutralized the magnesium citrate is precipitated.

Why is the carbon dioxide, liberated by the action of citric acid on magnesium carbonate, not utilized in carbonating the solution of magnesium citrate, instead of putting in potassuim bicarbonate? The amount of carbon dioxide from the magnesium carbonate is too great to use all of it and it would be difficult to regulate.

Why should bottles of magnesium citrate solution, and other bottles containing water and gas under pressure, be kept on their sides? To keep the stoppers wet and swollen so as to prevent the escape of gas.

Why should distilled water that has been recently boiled always be used in making solution of lead subacetate? Because ordinary water is apt to contain some non-volatile substances that would precipitate the lead, and distilled water, unless recently boiled, will contain some carbon dioxide and oxygen absorbed from the air, which will also precipitate the lead.

Why is there a white residue left after boiling lead acetate and lead oxide together with water? Because there is formed a basic, insoluble lead acetate besides the compound that goes into solution.

Why does a solution of lead subacetate always deposit a white solid on exposure to air? It absorbs carbon dioxide and forms lead carbonate.

Why is compound tincture of lavender used in Fowler's solution? It gives flavor and color.

Why is it advised to not keep Fowler's solution longer than a year? It is said to be slowly oxidized to an arsenate which is less active.

Why should solution of potassium citrate be made up fresh? It loses its carbon dioxide and soon spoils.

Why should solution of chlorinated soda be kept in glass-stoppered bottles protected from the light? Chlorine attacks ordinary cork stoppers, and light tends to decompose the hypochlorite.

Why is potassium bicarbonate used in preference to potassium carbonate in making solution of potassium hydroxide (1890)? Because it is purer.

Why is potassium bicarbonate in solution boiled until effervescence ceases in making solution of potassium hydroxide (1890)? So as to convert it into potassium carbonate, which reacts better, calcium acid carbonate being somewhat soluble.

Why are the mixture of lime and water and the solution of potassium carbonate heated before mixing? If mixed while hot the calcium carbonate is precipitated in a denser form and will settle more quickly.

Why is the solution separated from the insoluble matter by decantation or siphoning, rather than by filtration? In filtering through paper the alkali attacks the paper.

Why are 6.0 grams of potassium hydroxide used in making 100 grams of a five per cent. solution? Potassium hydroxide generally contains moisture

and carbon dioxide, the U. S. P. allowing as much as fifteen per cent. of impurities, and allowance is made for these in making the solution.

Why must solution of potassium hydroxide be protected from the air? It absorbs carbon dioxide readily.

Why should solution of potassium hydroxide be kept in green glass bottles rather than in flint? Potassium hydroxide dissolves green glass less readily.

Why does Labarraque's solution effervesce when an acid is added to it? An excess of sodium carbonate is generally present, and an acid liberates carbon dioxide. Chlorine is also liberated.

Why is nitric acid used in making solution of zinc chloride? Zinc frequently contains iron as an impurity. This is dissolved by hydrochloric acid, forming ferrous chloride, and nitric acid converts it into a ferric compound so that it may be more completely precipitated. Ferrous salts are not completely precipitated by hydrates or carbonates.

Why is the solution of zinc chloride evaporated and fused? To get rid of the nitric acid.

Why should the temperature of fusion be below 115° C.? So as to avoid volatilization and decomposition of the zinc chloride.

Why is zinc carbonate used in making solution of zinc chloride? It precipitates the iron as the hydroxide, and, being insoluble, the excess can be filtered out; no impurity is therefore introduced.

Why is solution of zinc chloride separated by decantation instead of by filtration? The concentrated solution, being caustic, would attack filter paper.

Why is ammonia used in solution of carmin, N. F.? Ammonia forms a soluble compound with carmin.

Why is iron and ammonium sulphate used in making solution of hypophosphite of iron, N. F.? It is nearly neutral and the iron hypophosphite is more completely precipitated.

Why is potassium citrate used in making solution of hypophosphite of iron, N. F.? The potassium citrate makes the hypophosphite soluble in water, perhaps by forming a double compound.

Why is diluted hypophosphorous acid used in solutions of ferrous iodide and ferrous chloride, N. F.? It retards or prevents oxidation of the ferrous salts to the ferric condition.

Why is lead carbonate preferred in clarifying the solution of gutta-percha, N. F.? Because it is heavy and will settle to the bottom notwithstanding the solution is very viscid.

Why is sodium bicarbonate used in pancreatic solution, N. F.? To make the solution alkaline. Pancreatin acts best in alkaline fluids.

Why is talcum used in preference to calcium phosphate in filtering aromatic solution of pepsin, N. F.? This solution contains hydrochloric acid which would dissolve the phosphate, but does not act on talcum.

Why is sodium bicarbonate used in making solution of saccharin, N. F.? To make the saccharin soluble.

Why is it that the N. F. directs one gram of sodium arsenate to 600 cubic centimeters of water in making Pearson's solution, and then states that the solution is one tenth as strong as the U. S. P. solution, which is one per cent. in strength? The U. S. P. directs the use of the anhydrous salt, whereas the N. F. uses the crystallized, which has seven molecules of water of crystallization.

Why is carbon dioxide evolved in Dobell's solution, since carbolic acid does not decompose sodium bicarbonate? Glycerin decomposes the borax, forming glycerol borate and sodium metaborate; water decomposes this glycerol borate, forming glycerin and boric acid, and the boric acid liberates carbon dioxide from the bicarbonate.

Why is the soluble essence of ginger, N. F., classified with solutions? Possibly because it does not contain much alcohol, although it has nearly as much as the soluble tincture of Tolu.

MASSES.

Why is boiling distilled water used to dissolve the ferrous sulphate in making mass of carbonate of iron? It is free from oxygen and so will not oxidize the ferrous salt to the ferric condition.

Why is the solution of ferrous sulphate added to

the solution of carbonate and not the carbonate to the iron? By adding the carbonate to the iron, there would be more danger of getting a basic instead of a normal carbonate of iron.

Why is the bottle filled with water before putting aside for settling? In order to exclude the air as far as possible to prevent oxidation.

Why is syrup added to the solution of ferrous sulphate in making mass of iron? Sugar prevents or retards the oxidation of the ferrous salt.

Why is the washing of ferrous carbonate by decantation preferable to washing on a filter? There is less exposure to the oxygen of the air.

Why does mass of carbonate of iron sometimes become brown on keeping? It oxidizes to ferric oxide which is brown.

Why is it that carbonate of iron thus prepared has a green color when pure ferrous carbonate is white? Because all the commercial ferrous carbonate contains some ferric salt, and this green product is a combination of ferrous and ferric iron.

Why are honey and glycerin good for extinguishing mercury? Because they are viscid and keep the globules of mercury apart.

Why is mass of mercury called "blue mass?" Mercury in a very fine state of subdivision has a bluish color.

Why is water used in making mass of copaiba (1890)? It aids the chemical reaction.

Why is it that copaiba solidifies with such a small

amount of magnesia? The magnesia combines with the resin, forming a bulky resin soap that solidifies the oil. Magnesia employed with the oil of copaiba does not cause solidification.

Why should care be used in choosing copaiba for making mass or pills of copaiba? Copaiba varies in viscosity and composition, and the thickest containing the most resin is the best.

MIXTURES.

Why should chalk mixture be made when wanted? It quickly becomes sour upon keeping, and the acid formed liberates carbon dioxide.

Why is sugar used in compound iron mixture? To prevent or retard the oxidation of the ferrous carbonate.

Why does compound iron mixture turn brown on keeping? The green ferroso-ferric carbonate oxidizes to red-brown ferric oxide.

Why is it better to make a concentrated aqueous solution of chloral hydrate and dissolve the extracts in this rather than to follow the N. F. directions in making the compound mixture of chloral and potassium bromide? Less of the resinous matter is subsequently precipitated. A strong solution of chloral hydrate is a good solvent for resins.

MUCILAGES.

Why is mucilage of acacia of but little service as a suspending agent when alcohol is present in large proportions? Acacia is insoluble in alcohol; it is thrown out of aqueous solution by it, and the emulsion is broken up.

Why is powdered acacia harder to dissolve in water than the granulated? In the preparation for granulation, acacia loses about two per cent. of moisture, but in getting it dry enough to powder it loses about ten per cent. of moisture. Moreover, powdered acacia makes masses with water which are hard to rub out.

Why is lime water used in mucilage of acacia? It neutralizes acidity and tends to prevent decomposition.

Why is it better to add only a small amount of water at first in making mucilage of acacia from the powdered acacia? The lumps that always form can be rubbed out much more easily and quickly.

Why is mucilage of tragacanth better than acacia as a suspending agent when ferric salts or borax are present? It is not coagulated by these.

Why does it take a smaller amount of tragacanth than acacia to act as an emulsifying or suspending agent? Only a portion of tragacanth is soluble in water, and that which does not dissolve swells and in so doing takes up a large amount of water before it makes a thin mixture.

Why is chondrus, washed with water before making it into a mucilage? To free it from salt and foreign matter.

OLEATES.

Why are oleates of the metals preferably made by double decomposition? Because oleic acid combines slowly with a metallic oxide or hydroxide.

Why is the oleate of mercury best made without heat? If even a little heat is used the oleate decomposes much more quickly, ultimately precipitating metallic mercury.

Why is it generally necessary to add acetic acid to clear a mixture of lead acetate and water in making oleate of lead, N. F.? Lead acetate contains a little lead carbonate, which is insoluble in water, but which is converted into the acetate by the acid.

Why must a large excess of acetic acid be avoided in making oleate of lead, N. F.? Acetic acid would liberate oleic acid from sodium oleate, making the oleate soft and sticky.

Why is it necessary to add some acetic acid to the solution of soap in making lead oleate? Soap is sometimes strongly alkaline, and the lead would be precipitated as the hydroxide or carbonate instead of the oleate.

Why is boiling water used in washing lead oleate? The heat softens or liquefies the oleate and thus gives the water a better chance to dissolve out the sodium acetate.

Why is the free alkaloid used in making an oleate of an alkaloid? The oleic acid combines with it to form a compound soluble in the acid. Alcohol is used to dissolve the alkaloid and aid reaction. The ordinary alkaloidal salts do not dissolve in oleic acid or olive oil.

Why are metallic oleates best made of normal strength? They keep better.

OLEORESINS.

Why is acetone used in place of ether in making oleoresins? It is not so volatile or inflammable and is a good solvent for oils and resins, combining the solvent properties of alcohol and ether.

Why should the oleoresin of male fern be stirred up before taking any out of the container? Filicic acid, the active principle, separates on standing.

Why should capsicum not be percolated to exhaustion in making oleoresin of capsicum? The last part of the percolation removes a large proportion of inert fatty matter and but a small proportion of active matter.

Why should oleoresin of cubebs be decanted? Inert cubebin settles out on standing.

Why is lupulin "very lightly" pressed in making the oleoresin? It yields so much soluble matter that the acetone solution would not be able to pass through the drug.

OILS.

Why do fixed oils vary in color? On account of oxidation products and the presence of other foreign matter, such as chlorophyll.

Why do the melting-points of different samples of the same kind of fat vary? The melting-point generally varies with the proportion of olein and stearin, and this varies with the season of the year and with the process of obtaining the fat. On account of this variation the determination of the melting-point is of but little value in testing for adulterations.

Why do non-drying oils undergo decomposition? Some authorities say that rancidity is due to the action of ferments liberating the free fat acids, and others say that rancidity results from the direct oxidation of the fat by oxygen and light acting simultaneously.

Why is the determination of the specific gravity of but little value in determining the identity or adulteration of an oil or fat? The specific gravity varies with the process of obtaining the fat, the process of purifying it, the presence of free fat acids, the age, the amount of oxidation, and the temperature.

Why is mercuric chloride used with iodine in making the iodine absorption tests for oils? Iodine reacts only slowly with a fixed oil at ordinary temperature, but much more readily in the presence of corrosive sublimate.

Why is a little heat generally used in obtaining fixed oils from seeds by pressure? Heat renders the oil less viscid and a larger yield is obtained, but the quality is generally not so good.

Why is winter-pressed lard oil preferable to summer-pressed? It contains less stearin than the summer-pressed product, and therefore remains liquid at a lower temperature.

Why is most of the expressed oil of almond obtained from the bitter almonds and not from the sweet? Although the bitter almonds contain less fixed oil than the sweet, they are cheaper, and the cake left from the fixed oil may be used for obtaining the volatile oil.

Why is sodium hydroxide sometimes used in purifying cottonseed oil? It converts a small amount of fat into soap, which on settling carries much of the coloring matter with it.

Why is so much cottonseed oil shipped to Mediterranean ports? Much of the olive oil comes from these ports, and cottonseed oil is used as an adulterant or substitute for olive oil.

Why should the linseed oil used in pharmacy be obtained by cold pressure? It is less acrid and not so highly colored.

Why is cod liver oil used more than other oils as a nutrient? It is more readily absorbed and assimilated, but why it is more readily absorbed is a question that has not been decided. Some say that it is because the oil contains biliary principles;

others think that it is because the presence of free fat acids facilitates emulsification.

Why can the silver nitrate test not be depended upon for the detection of cottonseed oil in olive oil? Cottonseed oil can be so purified that it will not give the test.

Why is castor oil boiled with water in purifying it? Boiling water takes out the albuminous matter and destroys the small amount of acrid poisonous matter that is removed with the oil.

Why is expressed oil of almonds heated to 250° C. in making phosphorated oil (1890)? To remove any air and water, and to cause the separation of some organic matter, all of which would tend to oxidize the phosphorus if they were present.

Why is ether used in phosphorated oil (1890)? It prevents oxidation and gives a more palatable taste.

Why are the volatile oils that are obtained by distillation usually distilled with water? They can be distilled at a lower temperature and with less resulting decomposition. The organic matter from which oil is obtained yields less of the empyreumatic substances.

Why is the "enfleurage" method frequently resorted to in obtaining oils? The method of extracting the oil by a neutral fat is used when the oil is present in small quantities and when it is decomposed by heat.

Why should volatile oils be protected from light

and air since they do not become rancid? Light and air cause an oxidation of the oil and a destruction of the characteristic odor. Ozone is developed by some oils.

Why do volatile oils, when dropped on paper, sometimes leave a stain which is not dissipated by heat? The stain is due to resinous matter, usually formed by oxidation. The stain can be distinguished from that of a fixed oil by the fact that it dissolves in alcohol.

Why is salt water used in distilling some oils, such as oil of cloves? Salt raises the boiling-point of water, bringing it nearer that of the oil, and is used when the oil has a high boiling-point.

Why are bitter almonds macerated with water for several hours before distilling? In order to allow the ferment to act on the amygdalin, forming the oil. Water is necessary for this reaction.

Why does oil of bitter almonds sometimes solidify on keeping? The oil consists chiefly of benzaldehyde which oxidizes, forming benzoic acid.

Why does the oil obtained from bitter almonds keep better than the synthetic oil of bitter almonds? It is claimed by some that in the natural oil the hydrocyanic acid is combined with the benzaldehyde, keeping it from being so easily oxidized.

Why is it customary to dry oil of bitter almonds over calcium chloride? If moisture is left in it tends to aid oxidation of the oil.

Why is synthetic oil of bitter almonds not good

for the finer perfumes? It often contains chlorinated compounds which possess unpleasant odors.

Why does oil of cassia become acid? It consists largely of cinnamic aldehyde which is slowly oxidized to cinnamic acid.

Why do oils of eucalyptus, cajuput, and rosemary resemble one another in odor? They contain eucalyptol (cineol).

Why are green juniper berries used for obtaining oil of juniper? They yield more oil than when fully ripe.

Why does oil of cajuput have a green color? When first distilled it contains some chlorophyll, but after rectification it is colorless. If the colorless oil is allowed to stand in copper containers it becomes green, due to the solution of a little copper. This copper cannot be detected by ammonia, as ammonia does not give the characteristic blue color.

Why is benzin used in estimating cineol in oil of cajuput? It dissolves the other constituents of the oil but not the cineol phosphate that is formed when phosphoric acid is added.

Why is potassium hydroxide used in estimating eugenol in oil of cloves? It combines with eugenol to form a soluble compound, the other constituents not combining do not dissolve in the water.

Why is oil of lemon obtained by expression rather than by distillation? The flavor is finer when obtained by expression.

Why should about five per cent. of alcohol be

added to oils of lemon, orange, and bergamot as soon as the retailer opens the containers? These oils change very quickly, acquiring a turpentine odor and taste. Alcohol preserves them.

Why do different oils of peppermint vary in their solidifying points? The solidification depends on the proportion of menthol present and this varies with the oil.

Why does oil of patchouly have a musty odor? Before the leaves are distilled they are piled in heaps and allowed to undergo some degree of decomposition.

Why is oil of pimenta distilled from the unripe fruit? The ripe fruit is nearly odorless.

Why do oils of pimenta, cloves, and bay have a somewhat similar odor? They all contain a large proportion of eugenol, to which the odor of the oils is largely due.

Why is oil of rose solid in cool weather? It contains a hydrocarbon which has a comparatively high liquefying-point. This hydrocarbon is not the odorous principle, although its presence is taken as an indication of the purity of the oil.

Why is Indian oil of sandalwood darker than that distilled in Europe? In India the distillation is prolonged and causes the formation of decomposition products.

Why are sandalwood trees left on the ground some months before distilling? The ants eat off the sapwood, leaving the heart-wood which yields the oil.

Why is black mustard macerated with water for some time before distilling the volatile oil? In order to allow the ferment to act on the glucoside sinigrin, forming the oil.

Why does oil of turpentine become acid? It slowly resinifies, forming abietic anhydride which is acid to litmus when dissolved in alcohol. Other acids, such as formic, acetic, and carbonic, are probably also formed.

Why is sodium hydroxide used in rectifying oil of turpentine? It neutralizes any acid and renders it, as well as the resin, less volatile.

Why is old oil of turpentine used in poisoning by phosphorus? It contains ozone which perhaps oxidizes the phosphorus to less poisonous products.

Why is oil of vetivert used in perfumery? On account of its sparing volatility it gives lasting properties to the perfume.

PILLS.

Why is the maximum weight of pills of organic matter about five grains, while that of pills of inorganic matter can be as high as nine or ten grains? The size sometimes governs the possible weight of a pill, and inorganic matter is usually less bulky than organic matter.

Why is it best to triturate potent substances with sugar of milk or other inert substance before mixing

them with the other ingredients of the pill mass? By so doing the potent substance is more thoroughly distributed throughout the mass.

Why is a mortar and pestle better than a pill-tile and spatula in making a pill mass? More pressure can be used in mixing the ingredients, the heat generated softens the mass, and there is less danger of getting in too much excipient.

Why are simple syrup, syrup of acacia, mucilage of acacia, and glucose objectionable as general pill excipients? Pills made with any one of them soon become so hard that they pass through the alimentary canal without dissolving. The addition of a little glycerin which is hygroscopic overcomes this objection.

Why is glycerin objectionable as a pill excipient when used alone? It is hygroscopic, and pills made with it may absorb moisture and become too soft.

Why is soap a good excipient for resinous substances? It not only makes a good mass, but probably aids the emulsification and absorption of the resin in the alimentary canal.

Why is sulphuric acid sometimes used in pills of quinine? It reduces the bulk by converting the quinine into the bisulphate.

Why should soap not be used with metallic salts? It combines with many of them, forming oleates or hydroxides if strongly alkaline.

Why should tragacanth be used only in small amounts as a pill excipient? If used in large quan-

tities it makes the mass so spongy that the pills are made with great difficulty.

Why cannot potassium permanganate, silver nitrate, and gold chloride be massed with common excipients? Because they are reduced. Some substance that will not be acted upon must be used.

Why are fibrous drugs frequently useful as pill excipients? They are absorbents and serve to bind the mass together, as well as to aid disintegration of the pill.

Why should althæa and tragacanth be used sparingly as pill excipients? They contain mucilage and are apt to make the pills hard. They also make the pill mass spongy and difficult to roll.

Why is lycopodium a good dusting powder? It is a fine powder, tasteless, repels water, and does not become sticky; moreover, it protects the pill.

Why is arrowroot or potato-starch better than corn-starch as a dusting powder? Corn-starch tends to stick together more than either of the other two.

Why must pills be kept in motion after being dipped in a hot solution of gelatin to coat them? If they were not kept in motion the coating would run to the lower side of the pill, forming a lump.

Why should glycerin not be used as a part of the pill excipient if the pill is to be coated with gelatin? Glycerin does not dry out and it dissolves the gelatin.

Why may either keratin or salol be used in coating pills when it is desired that the pill should not dissolve in the stomach? Both of these substances

do not dissolve in the acid contents of the gastric juice, but do in the alkaline fluids of the intestine.

Why is dried sulphate of iron used in preference to the crystalline in making pills of aloes and iron? The dried sulphate is less bulky.

Why does the mixture of salts with glycerin and water in pills of carbonate of iron get softer on triturating? It is due to the water of crystallization which is liberated when the reaction takes place.

Why is the crystalline sulphate of iron used in Blaud's pills in preference to the dried sulphate? It dissolves more rapidly and consequently reacts more quickly.

Why do pills of carbonate of iron change color? Ferric oxide is formed, which gives them a reddish color.

Why is reduced iron used in pills of iodide of iron? It is finer and reacts more readily.

Why is an excess of iron used in pills of iodide of iron? To prevent subsequent liberation of iodine by oxidation.

Why are iron and iodine triturated together until free from red color? This shows that all of the iodine has united with the iron.

Why are pills of iodide of iron coated? So as to prevent oxidation by the air and the liberation of iodine.

Why are pills of iodine best made with starch? Starch forms a compound with iodine, which is

easily broken up in the alimentary canal, giving the action of iodine.

Why are pills of phosphorus coated? To prevent oxidation.

Why is chloroform used in pills of phosphorus? Chloroform is a good solvent of phosphorus, and the phosphorus is thereby more evenly distributed through the pill mass. The vapor tends to prevent oxidation.

POWDERS.

Why are not all solids suitable for administration in the form of powders? Because some are hygroscopic, some are efflorescent, some are changed by the air, and some would have to be given in too large doses. Many of them would not have the effect desired if given in a concentrated form. Many of the very soluble salts are irritating to the alimentary canal.

Why are some solids best given in the form of powders? Because in such form they may act as mechanical protectives, such as bismuth subnitrate, for instance. Some are more pleasant and convenient to take in this way.

Why is less attention to incompatibilities necessary in dispensing medicines in the form of powders? Because when substances are kept dry and not heated there is but little danger of chemical change.

Why is it better to dampen such substances as resin, acetanilid, and salol with alcohol when they

are to be powdered? Because substances of this nature become more or less electrified by the rubbing, and adhere to the utensils or are scattered about, and alcohol overcomes this tendency.

Why are compound powders directed to be passed through a sieve? This breaks up all the lumps and mixes the powders more thoroughly.

Why should powders for insufflation be passed through a bolting-cloth? This overcomes the tendency to making a dense powder by trituration, leaving it light and fluffy.

Why is syrup better than water as a vehicle for the administration of powders? It is more dense and keeps the powder suspended better.

Why is the cachet or wafer better than a gelatin capsule for the administration of powders? Because the cachet when wet is slippery and assumes any form. In the stomach the cachet dissolves more quickly and does not produce the sensation of weight.

Why should potassium chlorate not be triturated with organic matter? Because there is danger of explosion.

Why should camphor be dampened with alcohol before being powdered? Because it can then be reduced to an almost impalpable powder; when rubbed alone it cannot.

Why is acacia used in compound chalk powder? This powder is used only in making chalk mixture, and the acacia helps to suspend the chalk.

Why is prepared chalk better than precipitated calcium carbonate in making compound chalk powder? It is not crystalline and is smoother, less gritty.

Why is the mixture of sodium bicarbonate and Rochelle salt wrapped separately from the tartaric acid in Seidlitz powders? If all the ingredients are mixed together moisture from the air is absorbed and chemical reaction takes place. Besides, if the mixture of the three ingredients is put into water effervescence is completed before all of the Rochelle salt is dissolved.

Why are two different colored papers used in wrapping Seidlitz powders? Because if only one colored paper were used there would be danger of two packages of the salt mixture or two of the acid being wrapped together.

Why are the small wooden measures used for measuring Seidlitz powders objectionable? Because the amount the measure holds varies with the atmosphere and with pressure, and the measure gets worn so that it holds less than it should.

Why, in making compound licorice powder, is the oil of fennel mixed with the sugar rather than with the senna? Because it can be more thoroughly and readily distributed through the powder.

Why is the oil of fennel preferred to the powdered fennel in compound licorice powder? Because the preparation keeps better.

Why is sugar of milk in as coarse powder as No. 30

used in making Dover's powder? Because in that condition it is gritty, and, in powdering it, it cuts up and divides the ipecac and opium more completely.

Why is it better, in making compound rhubarb powder, to mix the rhubarb and ginger first, and then incorporate the magnesia? The magnesia can be more readily and thoroughly mixed than by mixing the powders promiscuously.

GRANULAR EFFERVESCING POWDERS.

Why are effervescing powders frequently preferred to non-effervescing powders? Because the presence of carbon dioxide makes the mixture more palatable.

Why is the method of granulating by heat preferable to that of dampening with alcohol? Because there is less danger of chemical reaction during the process of manufacture, and because, too, it requires a much shorter time for drying.

Why is citric acid used instead of tartaric acid in granulating with heat? Because citric acid contains one molecule of water of crystallization, which is liberated by heat and makes a mass of the ingredients.

Why, in granulating by heat and passing through a sieve, must the manipulations be carried on quickly? Because the water of crystallization is soon driven off and the mixture loses the form of a soft mass.

Why should the mixture of sodium bicarbonate and acid not be triturated in a mortar? Because

hard pressure induces chemical reaction and the consequent liberation of carbon dioxide.

Why is it better to mix sugar and sodium bicarbonate together before mixing with the acid? The tendency to reaction is lessened.

Why must strong alcohol be used in granulating with alcohol? Because the water that the alcohol contains is left after the alcohol is evaporated, and the acid and sodium bicarbonate react in the presence of water.

Why must salts containing a large amount of water of crystallization be partially dried before granulating? Because frequently the water is liberated and induces the chemical reaction.

Why must well-tinned sieves be used in granulating powders? Because the acid would attack the iron or copper and the product would be discolored.

Why must granular effervescing powders be kept in well-closed containers? Because they are hygroscopic, and, absorbing moisture, chemical reaction takes place.

Why is a temperature of not over 54° C. best for drying effervescing powders? Powders thus dried keep better.

Why does the U. S. P. give the title Caffeina Citrata Effervescens instead of Caffeinæ Citras Effervescens? Because citric acid and caffeine are probably not combined, simply mixed.

Why is citric acid used in slight excess in the

formula for effervescing lithium citrate? It gives a more pleasant taste to the product.

Why does the U. S. P. (1890) direct the drying of effervescing magnesium citrate at a temperature not above 30° C.? Because a heat above that causes the formation of the less soluble normal magnesium citrate.

RESINS.

Why is hydrochloric acid used in making resin of mandrake? It renders the resin less soluble in water.

Why does the resin of mandrake of commerce differ in color? Because other substances than hydrochloric acid are used in precipitating it, and these influence the color.

SPIRITS.

Why, in making the spirit of nitrous ether, is the ethyl nitrite washed with water? To remove any alcohol that may have distilled over.

Why, in making the spirit of nitrous ether, are sodium and potassium carbonates used? Sodium carbonate is used to neutralize the acid and aid its removal from the distillate, and the potassium carbonate is used to remove the last part of water.

Why should the spirit of nitrous ether be kept in the dark? Light tends to decompose the ethyl nitrite, forming alcohol and nitrous and nitric acids.

Why is sulphuric acid used in estimating spirit of nitrous ether? To liberate nitrous and hydriodic acids so that the latter will decompose the former.

Why, in making spirit of ammonia, should alcohol recently distilled and kept in glass vessels be used? Alcohol is generally kept in barrels for a time, and it absorbs organic matter which is colored by ammonia; by using the recently distilled article this coloration is avoided.

Why is the ammonia water heated to a temperature not exceeding 60° C. in making spirit of ammonia? A higher temperature would drive over more water and thus dilute the alcohol.

Why is ammonia water used in making aromatic spirit of ammonia? It is used for its therapeutic effect and also to convert the ammonium bicarbonate into the normal carbonate, so that it will be soluble in alcohol.

Why does the U. S. P. direct ammonium carbonate in "translucent pieces"? So as to get the requisite amount of salt. Opaque pieces have lost ammonia and carbon dioxide and consist of ammonium bicarbonate.

Why is aromatic spirit of ammonia set aside for twelve hours before being filtered? In order to give time for the ammonium hydroxide to act on the bicarbonate.

Why does aromatic spirit of ammonia turn dark on keeping for some time? Alcohol frequently contains some aldehyde and other impurities which

are darkened by ammonia; then the gradual increase in color is due to the action of ammonia on the oils.

Why should whisky be at least four years old? So as to allow chemical changes to take place whereby some of the objectionable impurities are changed, and the acids combined with alcohols, forming ethers and esters.

Why should spirit of nitroglycerin be kept in cans rather than in bottles? Bottles are likely to get broken and the spirit leak out. The alcohol, being much more volatile than nitroglycerin, the latter is left, and in concentrated condition may be exploded. In case of such an accident, the U. S. P. directs the use of potassium hydroxide to decompose the nitroglycerin.

Why is peppermint herb used in making spirit of peppermint? Chiefly to give color.

Why should spirits of peppermint and lemon be protected from light? Light destroys the color.

Why is it better to wash the peppermint herb in water before using in making spirit of peppermint? Water takes out a yellow coloring matter so that the spirit has a better appearance.

Why add the water "gradually" in making bay rum (1890)? So that the formation of a permanent milkiness may be avoided as far as possible.

Why is bay rum (1890) allowed to stand eight days before filtering? To allow the mixture of alcohol and water to dissolve as much of the oils as it will, and also to let the excess of oils separate

and form larger globules, making them more easy to filter out.

Why is absolute alcohol used in making spirit of phosphorus (1890)? It is a better solvent than ordinary alcohol, which dissolves phosphorus but slightly.

SUPPOSITORIES.

Why is cacao butter a good suppository base? Because it is solid at ordinary temperatures, liquid at the temperature of the body, and is a bland, soothing substance.

Why, in hardening cacao butter suppositories, must care be used not to get too much of the hardening agent? Since the base does not dissolve in the alimentary canal, but melts, the melting-point must not be above the temperature of the body.

Why are hand-made suppositories preferable to suppository shells? In the hand-made suppositories the medicinal matter is mixed throughout the suppository, while in the shells the medicinal matter is not absorbed until the shell has been entirely melted, and may be in such concentrated form as to be irritating.

Why must a suppository mass not be too hot when it is poured into molds? If it contains medicinal matter insoluble in the melted base, the insoluble matter will sink to the apex of the cone.

Why is a base of gelatin and glycerin sometimes

preferred to cacao butter in making urethral and nasal suppositories? Because it is less likely to break.

Why should gelatin not be used as a base for ichthyol suppositories? Ichthyol makes gelatin insoluble.

Why are glycerin suppositories preserved in tight vessels? Because they are sufficiently hygroscopic to become liquid when exposed to the air.

Why are suppositories containing tannic acid best made in the cold? Because a heat not much above the temperature necessary for melting the base will cause the acid to form tough, hard masses.

Why should iodoform suppositories not be made with heat? The overheating of iodoform in cacao butter causes it to form masses.

SYRUPS.

Why should an excess of sugar be avoided in making syrups by heat? In cooling, the excess crystallizes out and more besides, leaving a solution that has been weakened sufficiently to be apt to ferment.

Why do some persons claim that heat is objectionable in making simple syrup? Continued heat inverts sugar to some extent, making it more likely to ferment.

Why does a syrup that has once fermented quickly ferment again, even after it is boiled? (1) The spores of the micro-organisms may not all have been

killed; (2) the proportion of sugar has been diminished by fermentation; and (3) part of the sugar has been inverted, in which condition it more readily ferments.

Why does syrup of acacia undergo decomposition more quickly than simple syrup? Because acacia in water spoils quickly. The preparation keeps better than when made by the previous formula.

Why does syrup of lemon spoil more quickly than syrup of citric acid? Syrup of lemon, being made from lemon juice, contains some albumin which always tends to cause decomposition.

Why does syrup of citric acid sometimes acquire a turpentine odor and taste? Oil of lemon changes on exposure.

Why is syrup of citric acid slightly opalescent? Tincture of lemon is used in making it, and the oil, separated from the alcohol by the syrup, causes the turbidity.

Why is althæa washed with cold water in making syrup of althæa (1890)? To remove dust and impurities.

Why is althæa macerated with cold water instead of hot? Hot water makes a preparation that is thick and stringy.

Why are alcohol and glycerin used in syrup of althæa? They act as preservatives.

Why is magnesium carbonate used in making syrup of orange? To aid the removal of finely precipitated matter.

Why, in making syrup of calcium lactophosphate, does the U. S. P. start with calcium carbonate instead of calcium phosphate, since calcium phosphate is ultimately formed? While calcium phosphate is soluble in acids, it is much less readily soluble after it has been dried. In following the official directions the calcium phosphate may be dissolved in the nascent condition. The phosphoric acid is diluted to prevent precipitation.

Why is syrup of lime boiled in a copper or tinned-iron vessel instead of glass or porcelain? The hot alkaline solution would be liable to attack the glass or porcelain.

Why must syrup of lime be well protected from the air? It absorbs carbon dioxide from the air, forming calcium carbonate, which is precipitated.

Why is syrup of lime stronger than lime water? Lime combines with sugar to form various saccharates which are more soluble than calcium hydroxide, and which, being loose combinations, are easily decomposed, thus acting as calcium hydroxide does.

Why is an excess of iron over iodine used in making the syrup of iodide of iron? Because if an excess of iodine were used it could not be removed by filtration as iron can be. The excess of iron also aids reaction and prevents oxidation.

Why is the reaction more rapid after some ferrous iodide has been formed in making syrup of iodide of iron? Chemical reaction generates heat and heat aids reaction. Also the ferrous iodide dissolves

iodine and gets it into form so that it will react more readily with iron.

Why is it necessary to check the reaction between iron and iodine? Sometimes the heat generated is sufficient to crack the vessel or to volatilize the iodine.

Why, in making the syrup of iodide of iron, is the mixture of iodine, iron, and water heated to boiling before filtering? So as to complete the chemical reaction.

Why is sugar added to the solution of ferrous iodide before filtering? Sugar has a reducing action and tends to prevent the oxidation of ferrous iodide.

Why is hypophosphorous acid added to the syrup iodide of iron? To prevent oxidation and liberation of iodine.

Why does syrup iodide of iron become red? Iodine is gradually liberated and dissolved. Sometimes caramelization of the sugar takes place.

Why should syrup of ferrous iodide be kept in direct sunlight? Direct sunlight prevents or retards the liberation of iodine and reduces it after it has been liberated.

Why should bottles containing syrup of iodide of iron be kept full? To avoid contact with air which oxidizes it.

Why should the syrup of the phosphate of iron, quinine, and strychnine be protected from light? Light gradually causes a chemical change in the iron, resulting in a darkened preparation.

Why is hypophosphorous acid used in syrup of hypophosphites? It aids the solution of the hypophosphites, particularly the calcium salt. It also gives a more pleasant taste.

Why is potassium citrate used in compound syrup of hypophosphites? To aid the solution of iron and manganese hypophosphites.

Why is potassium citrate used in the syrup of hypophosphites with iron (1890)? An alkali citrate makes the ferrous lactate more soluble, and it also prevents the precipitation of hypophosphite of iron.

Why should syrup of hypophosphites with iron (1890) be freshly made when wanted? It gradually changes, becoming darker.

Why must calcium phosphate not be used to aid filtration in making syrup of ipecac? Because it would be dissolved by the acetic acid.

Why is acetic acid used in syrup of ipecac? To convert the emetine into an acetate which is soluble.

Why is glycerin used in syrup of ipecac? To prevent souring; the syrup soon spoils if not protected by glycerin.

Why is sand used in making syrup of tar? To divide the tar so that water can be mixed with it better.

Why is the first water which is used in washing tar thrown away in making syrup of tar? Tar generally contains some pyroligneous acid and other impurities that are not wanted.

Why is alcohol used in syrup of tar? For its solvent effect.

Why is a wild cherry bark macerated for twenty-four hours in making syrup of wild cherry? To allow the ferment, emulsin, to act on the amygdalin, forming hydrocyanic acid and benzaldehyde.

Why must the sugar be dissolved without heat in making syrup of wild cherry? Heat would drive off the hydrocyanic acid and benzaldehyde.

Why is potassium carbonate used in syrup of rhubarb and aromatic syrup of rhubarb? It prevents the precipitation of resinous matter by forming a soluble compound with it.

Why, in making syrup of raspberries (1890), are the raspberries allowed to stand until the filtered juice mixes clear with half its volume of alcohol? Raspberries contain a pectinous substance which, if left in, tends to cause the decomposition of the syrup. It is destroyed or precipitated by this fermentation and a clear solution of the filtrate with alcohol indicates that it has been removed.

Why is syrup of raspberries (1890) heated to boiling? To precipitate any albuminous matter which may be left in and to destroy ferments.

Why is the mixture of the ingredients of compound syrup of sarsaparilla set aside for an hour before filtering? To allow nearly complete precipitation.

Why is the vinegar of squills heated to boiling in making syrup of squills (1890)? The vinegar con-

tains albuminous matter which is coagulated by heat and can then be filtered out. Albuminous matter tends to cause fermentation.

Why in making syrup of squills is the vinegar not boiled and strained? It is not now necessary since in making the vinegar the liquid is boiled and the albumin removed.

Why must a metallic vessel not be used in making syrup of squills? The acetic acid would attack the vessel.

Why is talc used in making compound syrup of squills? To aid the removal of the finely precipitated inert matter.

Why is potassium carbonate used in compound syrup of asarum, N. F.? To make soluble compounds with the resin in the asarum and the coloring-matter of the cochineal.

Why is citric acid used in syrup of calcium and sodium hypophosphites, N. F.? To aid solution and to give the preparation an acid taste.

Why is iodine added to the solution of ferrous iodide in making syrup of iodide of calcium, N. F.? To form the ferric iodide.

Why is the iron wanted in the ferric condition in making syrup of calcium iodide, N. F.? So that the reaction with calcium carbonate will be more complete, there being formed ferric hydroxide, which is precipitated, and calcium iodide, which is left in solution.

Why is potassium citrate used in syrup of calcium

lactophosphate with iron, N. F.? To aid the solution of iron lactate.

Why is solution of potassium hydroxide used in aromatic syrup of yerba santa? To prevent the precipitation of resinous matter by forming a soluble compound.

Why is iodine added to ferrous iodide in making syrup of citro-iodide of iron, N. F.? To convert the ferrous iodide into the ferric iodide, that salt being wanted.

Why is potassium citrate used in making syrup of hypophosphite of iron, N. F.? Hypophosphite of iron is only sparingly soluble in water, but readily soluble in an aqueous solution of a citrate probably forming a double compound.

Why is acetic acid used in syrup of sanguinaria, N. F.? To prevent precipitation.

TINCTURES.

Why is glycerin used in making tinctures? To aid in dissolving the active matter, particularly when this is tannic acid, and to retard or prevent subsequent changes and precipitation.

Why is the period of maceration shorter in making tinctures than in making fluid extracts? Because the proportion of the menstruum to the drug is much greater.

Why are some drugs put into the percolator without previous dampening in making tinctures? Be-

cause if they are first dampened they would pack too tight in the percolator and the menstruum could not pass through.

Why is evaporation not necessary in making tinctures as it is in making fluid extracts? Because by the time enough menstruum is used to get the required percolate the drug is exhausted.

Why should tinctures not be made from fluid extracts? Because the menstruums used in making the two classes of preparations are not always identical, and not infrequently the activity of the drug is modified by the heat necessary in making fluid extracts.

Why do tinctures of a fresh herb vary both in alcoholic strength and therapeutic value? Because the amount of water present at different times varies.

Why is the process of maceration sometimes preferable to percolation? Some drugs are resinous and of such nature that they cannot be percolated.

Why is tincture of arnica made by maceration and expression? The flowers are bulky and less alcohol is required than if they were percolated.

Why are tinctures of sweet orange-peel and lemon-peel made by maceration? The fresh peels are used and it is difficult to get the peels in suitable form for percolation.

Why is the sweet orange-peel deprived of its inner white part in making the tincture? The white part contains tannin and hesperidin, which make

the preparation objectionable when dispensed with iron.

Why is cinnamon used in compound tincture of gambir? To aid filtration and give a more pleasant taste.

Why is the tincture of ferric chloride set aside for three months? So as to allow chemical reaction to take place between the free acid and the alcohol, which results in the formation of chloric ether and other compounds which are supposed to have a diuretic effect. One writer claims that the ether is the result of action between ferric chloride and alcohol, ferric hydroxide being precipitated; he also claims that aldehyde, ferrous chloride and free hydrochloric acid are formed by action of ferric chloride on alcohol.

Why should tincture of iron be protected from the light? Light reduces it to the ferrous condition.

Why does a tincture of iron that is perfectly clear when first made sometimes precipitate on standing? A certain amount of free acid is necessary to prevent the precipitation of an oxychloride of iron, and, as the acid becomes used up in the chemical reaction which slowly takes place, the oxysalt is precipitated.

Why does the addition of glycerin to tincture of ferric chloride increase the color? Glycerin, as well as water, alcohol and other liquids, darkens the tincture on account of partial hydrolysis of ferric chloride into the hydroxide and hydrochloric acid. The

ferric hydroxide remains dissolved in the acid solution.

Why is it advisable to use a high grade of alcohol in making tincture of iodine? If the alcohol contains aldehyde or the higher homologues the iodine is changed more qucikly to hydriodic acid.

Why is it that a freshly-made tincture of iodine (1890) gives a precipitate of iodine when an old one may not? An old tincture frequently contains some hydriodic acid which is gradually formed, and this keeps the iodine in solution even in the presence of water. Precipitation is prevented in the present formula by potassium iodide. Potassium iodide also aids solution.

Why in making tincture of ipecac and opium is the tincture of deodorized opium evaporated to 800 grams instead of 900 cc., which with the 100 cc. of fluid extract would make the 1000 cc. of finished tincture? In evaporating a liquid it is rather more convenient to evaporate to a given weight than to a given volume and then by evaporating below 900 cc. the precipitate can be filtered out and the filter washed without getting too much filtrate.

Why is talc used in making tincture of kino? To aid filtration.

Why should tincture of kino be kept in small, well-stoppered bottles? If not so kept it is likely to gelatinize. Glycerin tends to prevent gelatinization. The amount of kino is now reduced one half and there is less danger of gelatinization.

Why is sand used in making tincture of lactucarium? To cut up the lactucarium and aid percolation.

Why is benzin used in tincture of lacucarium? To remove lactucerin, which is an inert caoutchouc-like substance.

Why is musk first rubbed with water in making tincture of musk? Water dissolves out more of the extractive matter than alcohol.

Why is tincture of nux vomica made from the extract? It gives a more uniform product, and is more convenient.

Why, in making laudanum, is opium macerated twelve hours with water before adding the alcohol? Water is a good solvent for the active principles and it disintegrates opium better than alcohol.

Why is benzin used in making tincture of deodorized opium? To remove the odorous principle and the narcotine.

Why must the aqueous opium extract and benzin not be shaken hard in making deodorized tincture of opium? If shaken vigorously an emulsion will be produced which requires a long time for separation.

Why is boiling water used in making tincture of quillaja? It dissolves out the saponin more readily than an alcoholic menstruum and heat does not decompose it.

Why is potassium carbonate used in aqueous tincture of rhubarb (1890)? It is alkaline and prevents the precipitation of resinous matter.

Why is acetic acid used in tincture of sanguinaria? It aids the solution of the sanguinarine and retards or prevents precipitation.

Why should the oil be removed from the tincture of strophanthus? The preparation is brighter in appearance and is not so liable to cause vomiting and diarrhœa when the oil has been removed.

Why is vanilla macerated with the menstruum previous to pounding it with sugar in making tincture of vanilla? The maceration softens it so that it can be more readily disintegrated by the sugar.

Why should the use of Fleming's tincture of aconite be discouraged? The tincture representing seventy per cent. of drug, the drug is not exhausted in making the tincture; besides, this tincture is much stronger than other tinctures, and its existence is not necessary in view of the existence of the official fluid extract and tincture.

Why is ammonia used in making detannated tincture of cinchona? To form ferric hydroxide with solution of ferric sulphate.

Why is ferric hydroxide better than solution of ferric sulphate for removing tannin? Ferric hydroxide combines with tannin to form an insoluble compound, which, with the excess of ferric hydroxide, can be removed by filtration. Ferric sulphate forms a soluble compound with tannin, which, with the excess of iron salt, cannot be removed by filtration.

Why, in making ethereal tincture of iron, is the

mixture of alcohol, ether, and solution of ferric chloride placed in direct sunlight? Light reduces the iron to the ferrous condition, and at the same time other changes take place resulting in the formation of chloric ether.

Why is ethereal tincture of iron put into a shady place after being decolorized? Partial oxidation results and the mixture contains ferrous and ferric iron.

Why does a deposit form in the tincture of citrochloride of iron? Because the alcohol throws the sodium chloride out of solution.

Why is potassium carbonate used in making compound tincture of guaiac? To prevent precipitation of resinous matter, the alkali forming a somewhat soluble compound with it.

Why is potassium iodide used in Churchill's tincture of iodine? To help keep the iodine in solution, as water precipitates it from alcoholic solution.

Why are sodium thiosulphate and ammonia water used in decolorized tincture of iodine? They decolorize iodine by reducing it chiefly to the iodide of sodium and iodide of ammonium. There is also a little iodate formed.

Why put decolorized tincture of iodine into a cool place before filtering? To aid the precipitation of sodium tetrathionate.

Why should the use of decolorized tincture of iodine be discouraged? The title of the tincture is misleading, as in reality the preparation is a tincture

of the iodides of sodium and ammonium and does not have the physiological effect of iodine.

TROCHES.

Why is tragacanth preferable to acacia in making lozenges? It makes a more tenacious mass.

Why is a gelatin base objectionable in making lozenges containing tannic acid? The tannic acid combines with gelatin to form an insoluble compound.

Why are fine powders not suited for making compressed tablets? Air gets in between the particles and is held there so that the particles do not stick together. A granulated powder works much better.

Why should tablet triturate molds not be washed with hot water? They are generally made of rubber and heat warps them.

Why is starch used in making compressed tablets? Starch may be used as a dilutent and it also has the property of making the tablet disintegrate more quickly.

OINTMENTS.

Why should an ointment base be free from rancidity? Because of the odor and because the free acid is frequently irritating and may sometimes cause chemical reaction.

Why is yellow wax better than white wax for ointments? In bleaching wax it undergoes a change which makes it more liable to become rancid.

Why is hydrous wool-fat a good ointment base in certain cases? Because it is readily absorbed, carrying with it the medicinal agent, and it can be mixed with a large percentage of water without losing its ointment properties. Moreover, it frequently aids in making an ointment when liquids are called for which are not miscible with the prescribed base.

Why does the U. S. P. allow as much as 30 per cent. of water in hydrous wool-fat? Anhydrous wool-fat is very tough and sticky, and the presence of 30 per cent. of water gives it the proper consistency for an ointment base.

Why is wool-fat recognized in addition to the hydrous wool-fat? The anhydrous fat is good for ointments containing water, and also good in cases where water is objectionable.

Why is lard a good ointment base? It is cheap, fairly readily absorbed, and will mix with some water.

Why is petrolatum a good ointment base in certain cases? It is cheap, is not readily absorbed, and consequently acts as a protective, and does not become rancid.

Why is glycerite of starch a good ointment base in certain cases? Because it is not greasy and can be easily washed off.

Why should medicinal agents be mixed with a small portion of the base first? Because they can be much more readily and thoroughly mixed.

Why should a solid be in an impalpable powder before mixing with the ointment base? Because it is almost impossible to powder after mixing.

Why are moderately soluble salts better rubbed with a little oil rather than with water in making ointments? If dissolved in water the latter will evaporate and the salts will crystallize and possibly become irritating.

Why should ointments be stirred when cooling? Because the ingredients having the higher melting-points will sometimes solidify first, making a granular ointment.

Why is paraffin an objectionable substitute for wax in ointments? Because it is liable to make the ointment granular.

Why should agents that are likely to react with one another in an ointment be rubbed separately with some of the greasy base and then mixed? They are protected by the base so that they do not come in sufficiently intimate contact to react.

Why should the temperature not rise above 60° C. in making benzoated lard? A higher temperature volatilizes to a greater or less extent the benzoic acid and volatile oil.

Why should an iron spatula not be used in making tannic-acid ointment? Tannic acid attacks iron forming a little tannate of iron, which gives a darkened ointment. If the spatula is first smeared with the fatty base there is but little danger.

Why should heat not be used in making ointment

of tannic acid? If the mixture is heated only a little above the melting-point of lard the acid becomes sticky and forms tough masses that cannot be distributed through the base. The glycerin relieves this trouble.

Why should a horn spatula be used in making an ointment containing salicylic acid? If an iron one were used the iron might be attacked slightly, causing a pinkish color due to the formation of salicylate of iron.

Why is rose water used in cold cream instead of enough oil of rose to perfume? Water makes the ointment more soft and creamy.

Why is it better to stir rose-water ointment for some time? The longer it is stirred the whiter it is.

Why is borax used in cold cream? To give a whiter and more creamy preparation.

Why is borax in cold cream sometimes objectionable? Because it is alkaline and reacts with some of the agents that are sometimes used with the ointment.

Why must the melted mixture of lead plaster and olive oil be partly cooled before adding the oil of lavender in making diachylon ointment? The oil of lavender would otherwise be volatilized.

Why is oleate of mercury used in making mercurial ointment? Because it is a good agent for extinguishing mercury.

Why should mercurial ointment be kept in a cool place? If it is warmed the mercury will separate.

Why is the term "blue ointment" now applied to the diluted mercurial ointment? Many customers buy blue ointment to be used without the physician's directions, and in many cases the fifty per cent. ointment is too strong.

Why do samples of citrine ointment vary in color and consistency? Because of the variation of heat used, and also on account of lard being frequently adulterated. This does not always explain the reason for variation, however, as samples are not always the same even when made with the same ingredients and at the same temperature.

Why should a metallic spatula be avoided in handling citrine ointment? The ointment is acid and attacks iron.

Why does citrine ointment sometimes become dark colored when it is mixed with an alkali? Because the mercury has been partly reduced to the mercurous condition and the alkali causes the black oxide to be formed.

Why does ointment of red oxide of mercury (1890) become discolored? The base becomes rancid and slowly reduces the mercury.

Why is lanolin better for making ointment of the oxides of mercury than simple ointment? The mercury oxides are not so readily reduced.

Why should heat not be used in making ointment of iodoform? Heat causes iodoform to cake into masses.

Why is potassium iodide used in ointment of

iodine? Iodine cannot be reduced to an impalpable powder, but it is very soluble in an aqueous solution of potassium iodide, and this solution can be intimately mixed with the base.

Why is water used in ointment of potassium iodide? Potassium iodide is difficult to powder, but is very soluble in water, and in solution can be more thoroughly mixed with the base.

Why is potassium carbonate used in making ointment of potassium iodide? Free-fat acids that are in lard when a little rancid liberate iodine, coloring the ointment. Potassium carbonate prevents this.

Why is lanolin better than lard for ointment of zinc oxide? The ointment is not so liable to become granular.

WINES.

Why is white wine used in preference to red wine in making medicinal wines? It contains less tannin and consequently has fewer incompatibilities.

Why is wine fortified with alcohol in making medicinal wines? To make the preparations more permanent.

Why is ferric hydroxide objectionable as a detannating agent for wine? Wine contains potassium acid tartrate, and this dissolves a little iron.

CHEMICALS.

ACIDS.

Why is dilute acetic acid preferred to vinegar in making pharmaceutical preparations? It is stronger, more uniform in strength, free from color, and preparations made with it keep better.

Why was acetic acid, sp. gr. 1.04 (twenty-nine per cent.), called "No. 8"? It was formerly used in the proportion of one part of acid to eight of water in making dilute acid.

Why should bottles containing acetic acid not be stoppered with rubber? The acid is likely to become contaminated with substances used in the vulcanizing of the rubber.

Why is litmus not a good indicator in estimating acetic acid in a liquid by means of a standard alkali solution? Acetates though normal in composition are alkaline to litmus, thus producing a lower result than is correct. Phenolphthalein is better for all organic acids.

Why in making acetic acid is distillation of wood carried on slowly at a temperature below 218° C.?

The yield of acid is larger, the distillate contains less empyreumatic matter, and the charcoal is better.

Why can not the determination of the specific gravity of acetic acid be relied on as a means of determining its strength? The specific gravity increases until the acid is about seventy-seven per cent. strong; then it remains about constant until the acid is about eighty per cent. when the specific gravity begins to decrease. Acetic acid of ninety-nine per cent. has about the same specific gravity as that of forty-six per cent.

Why does the odor of benzoic acid vary? Because it is obtained from different sources and retains to some extent the odor of the substance from which obtained.

Why is hydrochloric acid better than sulphuric acid in making boric acid from borax? Sodium chloride is more easily washed out than sodium sulphate, and it is said that under certain conditions sulphuric acid combines with boric acid. More crystallizations are necessary to purify the acid when sulphuric acid is used. Sodium nitrate is more readily washed out than the sulphate or chloride.

Why is the juice of lemons boiled in making citric acid? Heat coagulates albuminous matter so that it can be removed by filtration.

Why does the U. S. P. allow a little sulphuric acid as an impurity in citric acid? Excess of sulphuric acid is added to the calcium citrate to prevent the formation of calcium-acid citrate which would hinder

crystallization. Citric acid crystallizes better in the presence of a little sulphuric acid.

Why is lead sometimes an impurity in citric acid? The acid is usually crystallized in lead vats and dissolves a little metal.

Why is potassium hypophosphite used in making dilute hydriodic acid? Hydriodic acid is oxidized by air, liberating iodine, and potassium hypophosphite or hypophosphorous acid reduces it again.

Why is alcohol used in making dilute hydriodic acid? To cause the more complete precipitation of cream of tartar formed by the chemical reaction.

Why is the mixture of ingredients in hydriodic acid set aside in ice water before filtering? To precipitate the cream of tartar.

Why in making dilute hydriodic acid is the filter washed with dilute alcohol instead of water? Dilute alcohol does not dissolve cream of tartar as water does.

Why in making dilute hydriodic acid should the filter be washed until the filtrate does not give a turbidity with silver-nitrate solution? Absence of turbidity shows that the hydriodic acid has been all washed into the filtrate which is the part used.

Why is arsenic frequently an impurity in hydrochloric acid? Sulphuric acid, which is used in making hydrochloric acid, is often contaminated, arsenic occurring in the iron pyrites from which sulphuric acid is made.

Why is commercial hydrochloric acid colored red? The color is due to impurities, such as iron and organic matter.

Why does concentrated hydrochloric acid give rise to white fumes when exposed to air? These are due largely to the formation of ammonium chloride by combination with the ammonia of the air.

Why is the neck of the retort directed upward in making dilute hydrocyanic acid (1890)? There is some liability of sulphuric acid being carried over and this arrangement is to lessen that liability.

Why does the U. S. P. give the method of making dilute hydrocyanic acid from silver cyanide instead of from potassium ferrocyanide? Hydrocyanic acid does not keep well and can be made up extemporaneously from silver cyanide without having to assay it, although this method is more expensive.

Why should the use of Scheele's hydrocyanic acid be discouraged? It is two and one half times as strong as the official acid, does not keep as well, and is more variable and less reliable.

Why should dilute hydrocyanic acid be kept in small, dark, amber-colored, cork-stoppered bottles? Light causes the formation of the dark-colored paracyanogen. Moreover, Squibb found by experiment that the acid keeps better in cork-stoppered bottles, probably because a cork fits tighter than a glass stopper.

Why is diluted alcohol used in making dilute hypophosphorous acid, N. F.? To make the potassium

bitartrate more insoluble so that the acid will be purer.

Why is the mixture of solution of potassium hypophosphite and of tartaric acid set aside in a cool place for twelve hours in making dilute hypophosphorous acid? Because this increases the precipitation of cream of tartar.

Why is zinc carbonate or calcium carbonate used in making lactic acid by fermenting sugar? In order to neutralize the acid, for in the presence of much lactic acid some butyric acid is formed.

Why must the temperature of lactic acid fermentation not be below about 20° C., or higher than about 40° C.? A temperature below 20° C. tends to the formation of acetic acid, and one above 40° C. to the formation of butyric acid.

Why is lactic acid neutralized with zinc carbonate in testing it for glycerin? The zinc lactate formed is insoluble in the alcohol used to dissolve out the glycerin.

Why is sodium nitrate better than potassium nitrate in making nitric acid? It is cheaper, yields more acid, and does it at a lower temperature.

Why does nitric acid sometimes have a red color? The color is generally due to nitrogen tetroxide, which is a decomposition product of nitric acid.

Why does nitric acid give a yellow color when applied to the skin? With albuminoid substances it forms the yellow xanthoprotein.

Why in making dilute nitrohydrochloric acid does

the U. S. P. direct that strong nitric and hydrochloric acids be mixed, and then this mixture diluted with water, instead of mixing the dilute acids themselves? Chemical reaction takes place when the strong acids are mixed, but it is questionable whether it ensues when the dilute acids are used.

Why should nitrohydrochloric acid be kept in bottles not more than half full? The formation and giving off of gas may go on for some time, and there is less danger of bursting the bottle when it is not full.

Why should the temperature not go over 190° C. in driving off nitric acid from phosphoric acid in the process of making the latter? A higher heat tends to form pyro- and meta-phosphoric acids.

Why does the blackening on the addition of silver nitrate to phosphoric acid, or the turbidity on adding mercuric chloride, indicate phosphorous acid? Phosphorous acid reduces silver nitrate to the metallic condition, and reduces mercuric chloride to insoluble calomel.

Why should nitrohydrochloric acid be kept away from heat and light? Nitrosyl chloride and chlorine are both gases and light changes the former to nitrous and hydrochloric acids and the latter to hydrochloric acid.

Why in titrating phosphoric acid, does it take only one half as much standard potassium-hydroxide solution to get the end reaction when methyl orange is used as an indicator as when phenolphthalein is

employed? Phenolphthalein shows a neutral reaction with K_2HPO_4, but alkaline with K_3PO_4, while methyl orange shows neutral with KH_2PO_4, and alkaline with K_2HPO_4.

Why should glacial phosphoric acid be dissolved in water without heat in making dilute metaphosphoric acid, N. F.? Because heat readily changes it to pyro- and then orthophosphoric acid. Light and exposure to air also change it.

Why is "natural" salicylic acid preferred to "synthetic" acid by many physicians? The acid made from phenol has sometimes been found to be contaminated with carbolic and creosotic acids, which are more depressing and poisonous than salicylic acid. Synthetic acid, however, can generally now be relied upon for purity.

Why does salicylic acid sometimes have a pink color? It is due to the presence of a red decomposition product.

Why is sodium carbonate used in testing salicylic acid for carbolic acid as an impurity? Sodium carbonate converts salicylic acid into sodium salicylate which is insoluble in ether. Carbolic acid, remaining unaffected by the sodium salt, can be removed with ether.

Why does sulphuric acid so often contain arsenic? The acid is largely made by roasting iron pyrites, and the arsenic which occurs in the pyrites is volatilized.

Why should sulphuric acid be poured into water

and not water into the acid in mixing the two? There is less heat and less steam generated and less danger of accident.

Why does mixing sulphuric acid and water produce heat? It is said to be due to chemical reaction and contraction. Hydrates of sulphuric acid are formed.

Why does sulphuric acid when dropped on such organic matter as wood blacken it? The acid abstracts the elements of water and leaves carbon.

Why is lead so often an impurity in sulphuric acid? The acid is concentrated in lead vats; a little lead sulphate is formed and is dissolved by concentrated acid but is precipitated when the acid is diluted with water.

Why does the U. S. P. state that aromatic sulphuric acid should contain not less than twenty per cent. of absolute acid when it directs that 111 cc. of acid be used in making 1000 cc.? 111 cc. of sulphuric acid weigh 202.686 grams and contain 187.484 grams of absolute acid. The specific gravity of aromatic sulphuric acid is given as 0.933, making 1000 cc. weigh 933 grams. This gives about 20.09 per cent. by weight of acid.

Why does aromatic sulphuric acid gradually darken on keeping? It is due to a slow reaction of the acid with the aromatics.

Why does the addition of water to aromatic sulphuric acid cause a precipitate? Because the alcohol

is so diluted that the oil of cinnamon and the resin of ginger are no longer soluble.

Why is charcoal preferred to copper in making sulphurous acid? Theoretically none of the acid is wasted with charcoal, carbon dioxide, sulphur dioxide and water being formed. In using copper some of the acid combines with the copper to form copper sulphate.

Why should there be a thistle or safety tube in the sulphurous-acid generator? Because on removing the heat there is a contraction and the water of the wash-bottle may be sucked back into the generator, and coming in contact with the hot mixture and retort will cause explosion or cracking of the retort.

Why is sulphurous-acid gas washed in water? To remove sulphuric acid which might be volatilized in the process.

Why should the water employed to absorb sulphurous-acid gas be previously boiled? To remove ammonia and free oxygen which water absorbs on exposure to air and which cause the deterioration of the acid.

Why does the gas from sulphurous acid blacken mercurous-nitrate paper and not lead-acetate paper? It reduces mercurous salts to metallic mercury, but does not reduce lead salts.

Why should the name of the drug from which tannic acid comes be incorporated in the title of the acid? Tannic acid from different sources has different

properties, as for instance, tannic acid from nutgalls gives a blue-black with ferric salts while the acid from oak-bark gives a green-black.

INORGANIC COMPOUNDS.

Why is it better in making dried alum to let it thoroughly effloresce at a temperature below 80° C. and then heat to drive off the remaining water than it is to heat it to liquefaction as directed by the U. S. P.? The product so obtained is lighter, more porous, and less gritty. Stirring during the heating makes it more dense.

Why is it necessary to have a decided excess of sodium carbonate in making aluminum hydroxide, and why pour the alum solution into the carbonate solution slowly with constant stirring? In order to decompose all of the aluminum sulphate and to have no basic sulphate formed.

Why is sodium carbonate used instead of sodium hydroxide in making aluminum hydroxide? Sodium hydroxide combines with aluminum hydroxide to form a soluble compound while the carbonate does not.

Why are the solutions of alum and sodium carbonate heated just before mixing in making aluminum hydroxide? Chemical reaction takes place better and a more dense precipitate is formed which can be washed readily.

Why is aluminum hydroxide dried at a temperature below 40° C.? A temperature much above that will drive off some water of hydration, forming some aluminum oxide which is more gritty.

Why does a solution of alum effervesce when mixed with a solution of a carbonate? Alum is a little acid and aluminum hydroxide, not carbonate, is formed, liberating carbon dioxide.

Why in making ammonium benzoate should the solution of ammonium benzoate be kept alkaline during the evaporation? The salt is easily decomposed by heat, and ammonia tends to prevent decomposition.

Why does ammonium carbonate become white and opaque on exposure to air? It loses ammonia and carbon dioxide (the carbamate), leaving the bicarbonate.

Why does the U. S. P. direct the use of ammonia water in testing ammonium iodide for bromide and chloride as impurities? If an iodide, bromide, and chloride are all present they are precipitated by silver nitrate as silver compounds. Silver iodide is practically insoluble in ammonia water while the bromide and chloride are soluble. The iodide can be filtered out, and the adding of the nitric acid to the filtrate precipitates the bromide and chloride.

Why is a slight excess of antimony oxide used in making tartar emetic? So as to neutralize all of the cream of tartar, an excess of which cannot be filtered out as readily as an excess of antimony oxide.

Why is sodium bicarbonate used in estimating tartar emetic? Reaction takes place between the iodine and tartar emetic, forming hydriodic acid, which must be converted into a neutral salt or a reverse action takes place.

Why is hydrochloric acid added to silver nitrate in making molded silver nitrate? It forms a small amount of silver chloride which makes the fused sticks more tough and less brittle.

Why is care necessary in mixing silver oxide with organic matter? It gives up its oxygen very readily, forming explosive mixtures.

Why cannot sodium hydroxide be replaced by ammonium hydroxide in making silver oxide? Ammonia forms a soluble compound with silver oxide.

Why is sodium bicarbonate used in the official method of estimating arsenic trioxide? It is used to neutralize the hydriodic acid formed, for in an acid solution a reverse reaction would take place, hydriodic acid and arsenic acid forming iodine and arsenous acid. Sodium bicarbonate is preferable to the normal carbonate or the hydroxide because the end reaction with starch is more delicate.

Why is gold and sodium chloride recognized by the U. S. P. instead of gold chloride? Gold chloride keeps better when mixed with sodium chloride.

Why must bismuth subnitrate be boiled with citric acid until the mixture will give a clear solution with ammonia water, in making bismuth citrate? Ammonia forms a soluble compound with bismuth

citrate, but not with the subnitrate. If a clear solution with ammonia is not obtained, bismuth subnitrate is not all changed.

Why should a large excess of ammonia water be avoided in making bismuth and ammonium citrate? Heating bismuth citrate with a large excess of ammonia water tends to form the insoluble bismuth hydroxide.

Why is it customary in making bismuth subnitrate to convert the bismuth nitrate into the carbonate and then back into the nitrate? To get rid of arsenic.

Why in making precipitated calcium carbonate are solutions of calcium chloride and sodium carbonate hot when mixed? Heat makes the precipitated calcium carbonate denser and more easily washed free from the sodium chloride.

Why does lime produce heat when mixed with water? Chemical reaction takes place, forming calcium hydroxide.

Why does chlorinated lime become moist on exposure to air? It contains calcium chloride, which is hygroscopic.

Why should heat not exceed 25° C. in making chlorinated lime? Heat above that causes the formation of calcium chlorate.

Why is not all of the chlorine in chlorinated lime available? Part of it is combined as calcium chloride which is a stable compound and not decomposed by dilute or weak acids as calcium hypochlorite is.

Why is prepared chalk recognized by the U. S. P. when the purer calcium carbonate is official? Prepared chalk is less crystalline, smoother, softer, more adhesive, and better for internal administration.

Why is starch used in making sulphurated lime? It is not necessary, but aids in the reduction of the sulphate.

Why, in the U. S. P. method of estimating sulphurated lime, should ammonia water give no color when added to the filtrate from the mixture of sulphurated lime and copper sulphate? If the full amount of sulphide is in the sulphurated lime all of the copper will be precipitated and none will pass into the filtrate. If copper passes into the filtrate it will give a blue color when ammonia water is added.

Why is nitric acid used to wash out sulphuric acid from chromium trioxide? Nitric acid does not dissolve much of the chromium trioxide, does not cause chemical reaction, and can itself be removed by heating.

Why does the color of chromium trioxide vary? On account of the presence or absence of sulphuric acid, that which contains sulphuric acid having more of a scarlet color.

Why should asbestos or glass-wool be used for filtering solutions of chromium trioxide? Paper, cotton, or anything capable of being oxidized would be affected and the acid reduced.

Why is sodium bicarbonate used instead of sodium

carbonate in making saccharated ferrous carbonate? The carbon dioxide which is liberated protects the ferrous salt from oxidation to some extent.

Why is sodium bicarbonate dissolved in water "not exceeding 50° C." in making saccharated carbonate of iron? A higher temperature decomposes the bicarbonate, driving off the carbon dioxide, which is wanted to protect the ferrous salt.

Why is hot water used in washing ferrous carbonate in making saccharated carbonate of iron? Hot water dissolves sodium sulphate better and is free from absorbed oxygen which would otherwise tend to oxidize the iron.

Why does the U. S. P. method of estimating chloride of iron not always show all of the iron present? The official method estimates only the iron in the ferric condition. Ferrous iron does not liberate iodine from potassium iodide.

Why is excess of citric acid to be avoided in making scale citrate of iron? Acid keeps the salt tough and sticky so that it adheres to the glass on which it is spread and does not scale.

Why is the solution of citrate of iron evaporated at a temperature below 60° C. in making citrate of iron? A higher temperature causes a reduction of the iron.

Why, in testing ferric citrate for citric acid, is the filtrate heated with calcium chloride in order to get a precipitate when heat usually tends to dissolve salts? Calcium citrate is formed, and like many

calcium salts it is less soluble in hot water than in cold.

Why is ferric citrate preferred to citrate of iron and ammonia in making pills? It is not as hygroscopic and the pills retain their form better.

Why does the U. S. P. not give a chemical formula for citrate of iron? Because the water of hydration varies, although a formula might be given with limits, since the Pharmacopœia requires the salt to contain a nearly definite amount of iron.

Why are some samples of iron and ammonium citrate more hygroscopic than others? The larger the amount of ammonium salt present the more hygroscopic it is.

Why is one half of the tartaric acid neutralized with ammonia and then the balance of the acid added to this, in making iron and ammonium tartrate (1890)? This procedure makes ammonium bitartrate, to which is added later the ferric hydroxide forming a double compound.

Why should care be used not to get in an excess of ammonia in making soluble citrate of iron and quinine (1890)? Ammonia precipitates the quinine but not the iron in the presence of ammonium citrate.

Why should citrate of iron and strychnine not be prescribed in solution? According to Squibb a decomposition takes place in a few hours and strychnine is precipitated, rendering the mixture dangerous.

Why is ferric-ammonium sulphate used by the N. F. in making ferric hypophosphite, instead of one

of the more common iron salts? It is more nearly neutral and consequently will give a larger yield. Moreover, in an acid solution ferric hypophosphite changes to ferrous phosphate.

Why is sugar of milk added to the solution of ferrous iodide before evaporating in making saccharated iodide of iron (1890)? To prevent oxidation and the liberation of iodine.

Why is a heated mortar used in powdering the residue of iodide of iron and milk sugar? The residue is hygroscopic and the heated mortar tends to prevent the absorption of moisture.

Why is reduced iron added to the ferrous iodide in making saccharated iodide of iron (1890)? It combines with any iodine that may be liberated from the iodide by the air.

Why should a solution of ferric salt always be poured into ammonia, and not ammonia into the iron solution, in making ferric hydroxide? Because by adding the iron to the ammonia the latter is in excess and the ferric hydroxide is formed, while if the ammonia is added to the iron the latter is in excess and a basic salt is precipitated.

Why should solution of ferric sulphate and ammonia be cold and well diluted before mixing, in making ferric hydroxide? To prevent the formation of a basic compound. Several oxyhydrates may be formed, and the more basic the hydrate, the less soluble it is in acids.

Why is ammonium hydroxide preferable to sodium

hydroxide in making ferric hydroxide? Ammonium sulphate and the excess of ammonium hydroxide are more easily washed out than the corresponding sodium compounds.

Why is ferric hydroxide washed by decantation? It is bulky and gelatinous, not readily washed on the filter, and is less liable to become partially dry and changed to oxide.

Why must the soluble phosphate and the soluble pyrophosphate of iron be well protected from the light? Light renders them darker and less soluble.

Why do some persons think that soluble phosphate of iron and soluble pyrophosphate of iron are chemical compounds? Because, if they are mere mixtures, any salts that would be present would not give the green color; the color is therefore due to a new compound.

Why does ferrous sulphate frequently contain a little sulphuric acid? It is not so readily oxidized when acid is present.

Why does the official method of estimating ferrous sulphate not always estimate all of the iron present? Ferrous sulphate generally contains some ferric iron, and in the ferric condition iron does not reduce potassium permanganate.

Why, in making dried sulphate of iron, is ferrous sulphate allowed to effloresce at a temperature of 40° C. previous to heating on a water-bath? If heated at once on the water-bath the salt would dissolve in its water of crystallization; it would be

much harder to drive off the water and the residue would be more gritty and granular.

Why is not all the water removed in making dried sulphate of iron? The high heat necessary to remove all the water would probably cause more or less decomposition of the salt.

Why is sulphuric acid used in granulating ferrous sulphate? Ferrous sulphate almost always contains some oxysalt which does not dissolve, and sulphuric acid brings it into solution.

Why is alcohol used in making granulated ferrous sulphate? It washes out the water and acid, dissolving the ferric salt without dissolving the ferrous. The ferrous sulphate is dried in an atmosphere of alcohol which prevents oxidation.

Why is granulated ferrous sulphate preferably dried in the sunlight? As light has a reducing effect on iron salts, there is less danger of oxidation of the ferrous salt.

Why is reduced iron sometimes called "iron by hydrogen"? In making it hydrogen is passed over red hot ferric oxide and combines with the oxgyen leaving metallic iron.

Why is the current of hydrogen passed over the iron even after it is all reduced? To prevent air coming in contact with the iron while it is hot, in which condition it would absorb oxygen.

Why does reduced iron frequently contain an oxide? In making it, if a low red heat is used, the oxide is not all decomposed, and if a higher heat is

used a more dense and less desirable product is formed. If the iron is left in a moist atmosphere it absorbs oxygen.

Why is manganese dioxide sometimes added to mercuric sulphate and sodium chloride before subliming in making mercuric chloride? To prevent the formation of mercurous chloride.

Why is it that an aqueous solution of mercuric chloride is acid to litmus but becomes neutral on adding sodium chloride? It may be on account of forming a new double salt which is neutral.

Why should mercuric chloride, particularly when in solution, be protected from the light? Light reduces it slowly to mercurous chloride. This is prevented to some extent by the presence of an alkali chloride.

Why does the commercial mercuric chloride not always give a clear solution with water? It frequently contains a little mercurous chloride.

Why is ammonia used in testing mercuric chloride for arsenic as an impurity? The mercury and arsenic are first converted into the sulphides and the arsenous sulphide forms the soluble ammonium sulpharsenite which is subsequently decomposed by hydrochloric acid, precipitating the arsenous sulphide.

Why is the condenser kept at a temperature near that of the subliming point of mercuric chloride in making mercuric chloride and considerably below that of mercurous chloride in making mercurous chloride? It is desirable to have mercuric chloride in the form

of masses and mercurous chloride in powder so that they can be more easily distinguished. When the temperature of the condenser is near the subliming-point of a substance that substance will condense in the form of a mass, while if the temperature of the condenser is much below the subliming-point the substance will condense as a powder.

Why is a jet of steam introduced into the receiving chamber in making calomel? It makes the calomel fine and soft, and dissolves out any mercuric chloride formed.

Why should calomel not be triturated hard? It is decomposed slightly, forming metallic mercury which darkens it, and mercuric chloride which makes it more active.

Why does the color of calomel vary even when pure? The finer the powder the more yellow it is.

Why should calomel be kept in amber-colored bottles? Light slowly decomposes it, forming metallic mercury and mercuric chloride.

Why is an excess of mercury used in making yellow iodide of mercury? Because if the nitric acid is in excess some mercuric salt is formed.

Why should the nitric acid and metallic mercury be kept cool in making the yellow iodide of mercury? Heat tends to produce mercuric nitrate.

Why is a little nitric acid added to the watery solution of mercurous nitrate in making yellow iodide of mercury? To prevent the formation of a basic salt.

Why, in making this salt, is the solution of potas-

sium iodide poured into the solution of mercurous nitrate instead of the mercury into the iodide? If the mercury is poured into the potassium iodide solution the latter is in excess at first, at least, and in this condition decomposes the mercurous iodide which is first formed, giving mercuric iodide and metallic mercury. The mercuric iodide further combines with potassium iodide to form a soluble double salt.

Why is it well to wash mercurous iodide with alcohol? To dissolve out any mercuric iodide that may be present.

Why must mercurous iodide be protected from the light? Light decomposes it, forming mercuric iodide and metallic mercury, the latter darkens it.

Why is much of the mercurous iodide green instead of yellow? Because it contains some finely divided metallic mercury. Mercury finely divided has a bluish color, and this with the yellow gives a green.

Why does the U. S. P. direct the solutions of mercuric chloride and potassium iodide to be poured simultaneously into water in making mercuric iodide? Because if either solution is poured into the other a soluble double compound is formed.

Why does the formula call for a slight excess of potassium iodide in making mercuric iodide? Because it is desirable to have all the mercuric chloride decomposed, even though there is a little loss in subsequent washings.

Why is the solution of mercuric chloride poured into the solution of sodium hydroxide and not the

hydroxide into the mercury? Having the alkali in excess, the yellow mercuric oxide is precipitated, while if the mercury is in excess the red-brown oxychloride of mercury is precipitated.

Why are the solutions of mercuric chloride and sodium hydroxide well diluted before mixing, in making yellow oxide of mercury? To avoid the red-brown oxychloride. For the same reason the mercury solution must be added slowly with constant stirring to the alkali solution.

Why is the mixture of these solutions allowed to stand for an hour? To complete the reaction and decompose any oxychloride formed.

Why must the sodium hydroxide be free from carbonate? The carbonate forms a basic compound which is more red.

Why does the U. S. P. direct a temperature of about 30° C? The higher the temperature the quicker will be the reaction, but a temperature above 30° C. tends to the formation of a reddish salt.

Why should mercuric oxide be washed until the washings give no turbidity with a solution of mercuric chloride? So long as a turbidity results there is some sodium hydroxide present.

Why should yellow oxide of mercury be protected from the light? Light decomposes it, forming metallic mercury and oxygen and the metallic mercury causes it to darken. It changes more readily than the red on account of its greater fineness.

Why was the yellow subsulphate of mercury called

turpeth mineral? It is a mineral substance somewhat resembling powdered turpethium in appearance.

Why is nitric acid used in making yellow subsulphate of mercury (1890)? Because it assists the formation of mercuric sulphate.

Why is mercuric sulphate solution evaporated to dryness and heated on a sand-bath? To get rid of the excess of acid.

Why is mercuric sulphate added to boiling water in making yellow subsulphate of mercury? Because this causes decomposition and the formation of the basic compound.

Why is an excess of ammonia used in making ammoniated mercury, and why is the precipitate washed with water containing ammonia? Because there is liability of forming a yellow basic salt unless ammonia is present.

Why is the solution of mercuric chloride filtered before pouring into ammonia in making ammoniated mercury? To remove any calomel which, if present, would give a black compound with ammonia.

Why should ammoniated mercury not be washed with an excessive amount of water or dried with heat or exposed to light? All tend to change it to a yellow basic compound.

Why is chalk made into a mass with water before mixing with the finely divided mercury in making mercury with chalk? If an attempt were made to mix the dry carbonate with the mixture of honey and divided mercury it would become so dry that

the mixing would cause the union of the small globules of mercury.

Why should mercury with chalk be powdered without trituration? Rubbing causes the small particles of mercury to unite to form larger globules.

Why should mercury with chalk be protected from the air and light? Metallic mercury when finely divided is easily oxidized and becomes darker.

Why is sodium carbonate preferred to potassium carbonate in making magnesium carbonate? It is cheaper and purer; and the sodium sulphate is easier to wash out than the potassium sulphate.

Why does magnesium carbonate vary in composition? The extra heat used in making the heavy carbonate drives off more of the carbon dioxide.

Why does magnesium carbonate vary in density? The heavy salt is made by mixing hot concentrated solutions of magnesium sulphate and sodium carbonate, and the light salt by mixing cold dilute solutions.

Why does heat aid in the precipitation of magnesium carbonate from a mixture of the solutions of magnesium sulphate and sodium carbonate? Heat drives off the carbon dioxide, which otherwise remains and holds some of the magnesium in solution as the bicarbonate.

Why should the heating of magnesium carbonate not be continued too long, nor allowed to get above a dull red heat, in making magnesia? Both con-

ditions tend to make magnesia lumpy and granular and less readily soluble in acids.

Why are some magnesium oxides much lighter than others? Heavy magnesia is made by calcining heavy magnesium carbonate, while the light is made by calcining the light magnesium carbonate. High heat, pressure of the carbonate before calcining, moistening the carbonate before calcining, heavy trituration of magnesia, all have a tendency to render the magnesia more dense.

Why, in mixing magnesia with water, should the magnesia be added to a large excess of water? A small amount of water makes the magnesia hard, gritty, and lumpy, while a large amount of water gives a smooth gelatinous hydroxide.

Why does one part of magnesia with fifteen parts of water give a solid mass? Water is taken up to form the hydroxide.

Why is it generally necessary to add a little acetic acid to get a clear solution of lead acetate in water? On exposure to air lead acetate absorbs carbon dioxide and forms the insoluble lead carbonate and the acid dissolves this.

Why should the solution of lead acetate be added to potassium iodide in making lead iodide? If the iodide is added to the lead an oxyiodide is formed.

Why is it necessary to have free nitric acid present in crystallizing lead nitrate? If it is not present the crystals will be more or less opaque.

Why does lead oxide vary in color? The color

depends on the temperature of oxidation and the rapidity of cooling, being more yellow when cooled rapidly.

Why is a warm mortar directed in making potassa with lime? Potassa is hygroscopic, and heat prevents the absorption of moisture while mixing.

Why should a higher heat than just enough to cause a chemical reaction be avoided in making sulphurated potassa? High heat tends to the formation of potassium sulphate.

Why must sulphurated potash be protected from air? To prevent the absorption of moisture and oxygen which will change it to a sulphate.

Why is acetic acid used in excess in making potassium acetate? If the alkali is in excess the salt is apt to be colored.

Why is potassium acetate heated in estimating it? Heat converts it into the carbonate, which can be estimated by a standard acid solution.

Why is methyl orange preferable to phenolphthalein and most other indicators in titrating a carbonate? It is not affected by carbon dioxide.

Why is potassium bicarbonate purer than the normal carbonate? The carbonate is quite strongly alkaline and dissolves silica. In passing carbon dioxide into a solution of carbonate, it changes the normal carbonate to the bicarbonate, precipitates the silica, and the bicarbonate can then be crystallized.

Why is charcoal used in making potassium bromide when it is made by the direct combination of bromine and potassium hydroxide? While most of

the bromine combines with the potassium to form potassium bromide, about a sixth of it forms potassium bromate; and heating the bromate with charcoal reduces it to the bromide.

Why does the addition of dilute sulphuric acid to potassium bromide, resulting in the getting of bromine, indicate the presence of a bromate, since dilute sulphuric acid does not liberate bromine from either a bromide or a bromate? Sulphuric acid liberates hydrobromic acid and bromic acid, and these react on each other, liberating bromine from both.

Why does the U. S. P. allow potassium bromide to be slightly alkaline? The presence of a small amount of carbonate prevents the liberation of bromine.

Why, in estimating a chloride as an impurity in potassium bromide, does the U. S. P. direct that it should not require more than 25.85 cc. of N/10 silver-nitrate solution to produce a red color? A red color is produced only after all of the bromide and chloride are precipitated. Potassium chloride takes more silver nitrate for precipitation than the same weight of potassium bromide, consequently the Pharmacopœia limits the amount of silver.

Why does potassium carbonate occur in granular form? It is deliquescent and not easily crystallized and in the granular form it is more permanent.

Why is potassium chlorate heated with aluminum and potassium hydroxide in testing it for a nitrate as an impurity? The chlorate and nitrate are reduced. Ammonia is formed from the nitrate.

Why does the getting of a precipitate by adding acetic acid to potassium citrate indicate the presence of a tartrate? If the tartrate is present it is there in the form of a normal salt and is soluble. Acetic acid converts it into the bitartrate, which is sparingly soluble.

Why, in estimating potassium cyanide, does the amount of silver nitrate solution taken to produce a permanent precipitate represent only one half of the silver solution necessary to make pure silver cyanide? One molecule of potassium cyanide combines with one of silver cyanide to form the insoluble silver cyanide. This then combines with another molecule of potassium cyanide to form a soluble double compound. It is only after all of the potassium cyanide is taken up in this double compound that the addition of silver nitrate causes a permanent precipitate.

Why is potassium and sodium tartrate called Rochelle salt? It was first prepared at Rochelle, France.

Why does the addition of acetic acid to a strong solution of Rochelle salt produce a precipitate? The acid combines with the sodium and liberates the potassium acid tartrate which is not very soluble.

Why is potassium bicarbonate used rather than the normal carbonate in making potassium hydroxide? It is purer.

Why is the solution of potassium hydroxide evaporated in metallic vessels? Because glass or earthenware is attacked by alkalies, forming soluble silicates.

Why are green glass bottles better than flint bottles for containing potassium hydroxide? The green glass is not so readily attacked as the flint.

Why should a solution of potassium hypophosphite be evaporated at a temperature below its boiling-point? At the boiling-point of the solution there is danger of decomposition and also danger of explosion.

Why is a solution of ammonium molybdate of no service in testing potassium hypophosphite for a phosphate as an impurity? The ammonium molybdate solution contains free nitric acid which would oxidize the hypophosphite to a phosphate, and thus a test would be obtained though a phosphate may not have been there originally.

Why in testing potassium hypophosphite for a chloride is the hypophosphite first heated with nitric acid? To oxidize the hypophosphite to a phosphate so that it will not reduce the silver nitrate and interfere with the test.

Why is it best to evaporate a solution of potassium iodide at about 50° C. to 60° C. in crystallizing the salt? Larger crystals are formed than if a higher temperature were used and the solution does not creep over the edges of the dish so much as it does at a lower temperature.

Why is potassium iodide sometimes whiter and more opaque than it is at others? Potassium carbonate tends to make it whiter.

Why is potassium carbonate often an impurity

in potassium iodide? It tends to prevent the liberation of iodine.

Why is the little amount of potassium carbonate that is left in objectionable? It makes the iodide more hygroscopic and also alkaline, so that a solution of it may cause precipitation with metallic and alkaloidal salts when a pure iodide would not.

Why does dilute sulphuric acid liberate iodine from potassium iodide if it is contaminated with iodate? Sulphuric acid liberates hydriodic and iodic acids, and these react on each other, liberating iodine.

Why in testing potassium iodide for a nitrate is the nitrate changed to ammonia instead of making the test with ferrous sulphate and sulphuric-acid? Concentrated sulphuric acid liberates iodine which would interfere with the test.

Why does the U. S. P. direct that not more than 30.8 cc. of decinormal silver-nitrate solution be used for 0.5 gram of potassium iodide, in testing this salt? More would indicate contamination with a bromide or chloride.

Why is asbestos used in filtering a solution of potassium permanganate? Asbestos is not acted on like filter-paper, cotton, or an organic medium.

Why is sodium carbonate allowed to effloresce before heating, in making dried sodium carbonate? Because, if heated at first, the salt dissolves in the water of crystallization; the water is driven off

with difficulty, and the product thus obtained is granular instead of being smooth.

Why is commercial sodium chloride hygroscopic? It often contains a little magnesium chloride or calcium chloride, either of which is deliquescent.

Why does sodium hydroxide produce heat when dissolved in water? A large number of hydroxides are formed and the chemical reactions cause the heat.

Why does sodium hydroxide sometimes appear efflorescent? Caustic soda is deliquescent and also absorbs carbon dioxide from the air. When it has absorbed considerable carbon dioxide the carbonate formed becomes efflorescent.

Why does sodium iodide produce heat when dissolved in water, while the corresponding potassium iodide does not? Official sodium iodide is anhydrous and takes up two molecules of water of crystallization.

Why is the common method of detecting a nitrate by means of ferrous sulphate and sulphuric acid not used in testing sodium iodide for a nitrate? Strong sulphuric acid liberates iodine from an iodide and this would interfere with the test.

Why is heat used in making sodium sulphocarbolate? Heat forms a para-salt, which is official. In the cold the ortho-salt is formed.

Why is sodium salicylate usually slightly acid? A little free acid is left in it because it does not turn red as quickly when the salt is a little acid as when it is neutral or alkaline.

Why is cotton or glass-wool better than filter-paper for filtering a solution of a salicylate? Filter-paper often contains a little iron which gives a pink or red color with a salicylate.

Why is the receiving-chamber not allowed to get hotter than about 110° C. in making sublimed sulphur? At about 115° C. sulphur melts and would then run together and form brimstone.

Why should sulphur be protected from moisture? Moisture aids oxidation.

Why is ammonia used in making washed sulphur? It neutralizes any free acid, making it easier to wash out, and it dissolves the sulphide of arsenic which is frequently present.

Why is hydrochloric acid used short of neutralization in making precipitated sulphur? Because if an excess of acid is used, or even enough to cause neutrality, the soluble compound of lime and sulphide of arsenic is decomposed, and sulphide of arsenic is precipitated with sulphur.

Why should sulphuric acid not be substituted for hydrochloric acid in making precipitated sulphur? Sulphuric acid forms the nearly insoluble calcium sulphate, which could not be removed.

Why is precipitated sulphur whiter than the flowers of sulphur? Because it is more finely divided.

Why is hydrochloric acid used in purifying talcum? It forms soluble compounds with many of the impurities, leaving the magnesium silicate.

Why does zinc chloride frequently not give a

clear solution with water? On account of a basic chloride which can best be gotten rid of by filtering through asbestos or glass-wool.

Why is it necessary to treat zinc sulphate with alcohol in order to determine the presence or absence of free acid? The salt itself is acid, but it is not soluble in alcohol, while the free acid is.

ORGANIC DRUGS.

Why is a powdered drug more liable to deterioration than the whole drug? Because more surface is exposed to light and air.

Why should ether be kept away from light and air? It is slowly oxidized, forming hydrogen dioxide, ozone, aldehyde, and acetic and formic acids.

Why is heat produced when alcohol and water are mixed? Chemical reaction and contraction of volume take place, forming hydrates of alcohol.

Why is alcohol used in purifying aloes? The melted aloes is too thick to pass through the sieve; alcohol thins it.

Why is the sieve dipped in hot water just before pouring the melted aloes through? This prevents the clogging of the sieve by the chilled mass.

Why should aspidium be made up into preparations soon after collecting? The crude drug loses strength more rapidly than its preparations do. Filicic acid is said to change to an inactive anhydride.

Why should the medicinal parts of belladonna be collected from the second to fourth years? The

proportion of atropine is greater during that period. In the young plants hyoscyamine predominates.

Why should the large woody roots of belladonna be rejected? The alkaloids are mostly in the bark.

Why was the name belladonna applied to this drug? The word signifies beautiful lady. It is said that Italian ladies used this drug to dilate the pupils of the eyes, thus giving a brilliant appearance.

Why does the U. S. P. give the title "caffeina citrata" instead of caffeinæ citras? This preparation is probably a mixture of caffeine and citric acid and not a true salt as would be indicated by the term caffeinæ citras.

Why does camphor sublime on the back of the stock-bottle? The back of the bottle is nearer the wall which is generally cooler than the air in the store.

Why do some persons claim that cannabis indica should be kept in perforated boxes? They say that stored in this way it retains its aromatic properties for two or three years, whereas when kept in tight containers the water retained by the drug induces fermentation.

Why is acid used in purifying animal charcoal? It dissolves out the phosphates and carbonates. In decolorizing acid liquids only the purified charcoal should be used.

Why is animal charcoal used for decolorizing fluids rather than wood charcoal? It has a stronger property of absorbing colors.

Why is animal charcoal not effective as a decolorizing agent after it has been exposed to the air for some time? It has absorbed gases from the air which prevent the absorption of coloring-matter. Heating the charcoal will again make it effective.

Why is starch sometimes found in beeswax when it is not put there as an adulterant? In pressing wax into cakes, starch is put on to the rollers to prevent the wax from sticking.

Why does spermaceti become rancid on exposure to air? Rancidity is due to a change in the oil which has not been entirely removed.

Why does the U. S. P. allow as much as one per cent. of alcohol to be present in chloroform? This small amount of alcohol acts as a preservative; chloroform is quite easily decomposed when pure.

Why is chondrus exposed to the sun for a week or more? To bleach it.

Why was the drug cinchona given that name? From the fact that the wife of the fourth Count of Chincon was cured of malaria by it, and she introduced it into Europe.

Why are some specimens of coccus cacti black and some silver-gray? The silver-gray bugs are killed by the heat of a fire, while the black ones are killed by hot water.

Why are the cochineal insects called coccus cacti? They get the name coccus from their resemblance to a berry and the name cacti from the fact that they feed on a species of cactus.

Why should the pericarp of cardamom be discarded? It contains but little oil.

Why is creosote usually obtained from beechwood? Beechwood yields a rather larger amount than other woods.

Why is the word "beechwood" so often used to describe creosote? An impure carbolic acid is sometimes sold under the name creosote.

Why are cubebs gathered while still green? They are more pungent then and do not fall off so readily.

Why should ergot not be kept longer than a year? It deteriorates rapidly. It is said that this is due to the fixed oil becoming rancid, and that if the oil is removed the medicinal properties remain unchanged for a long time.

Why are the fluid extract and the extract of ergot the best preparations? They contain all the constituents of the drug, and no one constituent represents the drug.

Why is eucalpytus cultivated in malarial districts? The tree absorbs much water, drying up the ground, and its eminations are antagonistic to the malarial germ.

Why is gentian used more than other bitters? It has a pleasanter taste and does not contain tannin, so can be given with iron.

Why is alcohol used in making purified ox-gall? Alcohol precipitates ine t matter that would make the gall tough when dried if left in.

Why is ginseng valued so highly by the Chinese? The roots often grow into a form resembling that of a man, and the Chinese have a superstition that this drug will cure nearly all diseases.

Why is glycerin in itself not a good solvent? It is so viscid that it prevents diffusion.

Why is glycerin used in purified honey? To aid preservation.

Why is glycerin used in making gelatin capsules? It prevents the capsules from cracking so readily.

Why is the Spanish glycyrrhiza preferred to the Russian? It is a little sweeter.

Why is sulphuric acid used in making ammoniated glycyrrhizin? It is used to precipitate glycyrrhizic acid, which can be filtered out, washed, and purified. Ammonia water added later converts it into the soluble salt.

Why is purified cotton more absorbent than ordinary cotton? Ordinary cotton has oil and fatty matter in it which prevent the absorption of water. In purified cotton these substances have been removed.

Why are liquid preparations of kino unstable? The pectin present often causes gelatinization.

Why is lycopodium called vegetable sulphur? It is yellow like sulphur and burns readily.

Why are nutmegs limed? To protect them from insects.

Why is sodium hydroxide used in obtaining pure carbolic acid from the crude product? Crystalline

sodium phenolate is formed, leaving fluid hydrocarbons and other impurities. The sodium compound can be heated to 170° C. without decomposition, thus getting rid of other substances.

Why was phenol called an acid? Because it combines with some bases, though not readily neutralizing alkalies.

Why was the portion of the distillate coming over between 165° C. and 190° C. called "dead oil"? Because it was thought to be valueless.

Why should the melting-point of carbolic acid be not less than 40° C. and its boiling-point not over 188° C.? A lower boiling-point or a higher melting-point indicates a less hydrated phenol.

Why should care be used in melting carbolic acid? It forms an inflammable vapor, and when this is mixed with air it may be exploded with violence by contact with a flame.

Why does carbolic acid acquire a red color? Some writers say it is due to the presence of aurin and rosolic acid, which form red compounds by absorption of carbon dioxide and oxygen. Other writers say it is due to absorption of ammonia and ammonium nitrate, or to the alkalies in the glass of the container, or to the presence of iron.

Why does the U. S. P. give the solubility of carbolic acid as 19.6 parts of water when the acid makes a liquid with less than ten per cent. of water? The addition of a small amount of water converts phenol

into hydrates, which are liquid but not very soluble in water.

Why is an excess of bromine used in estimating carbolic acid? So as to precipitate all of the acid as tribromophenol.

Why is potassium iodide used in estimating carbolic acid? The excess of bromine combines with the potassium, liberating an equivalent amount of iodine, which is more easily and accurately estimated by sodium thiosulphate than the bromine.

Why are the preparations of pilocarpus leaves less reliable than preparations of pilocarpine? The leaves contain jaborine which is antagonistic to pilocarpine in action. The proportion of the two alkaloids varies in different samples of leaves.

Why is physostigma called ordeal bean? In Africa some of the native tribes use it to determine the guilt or innocence of a person suspected of a crime. The accused is made to eat the beans until he vomits or dies. If he vomits and lives he is innocent, but if he dies he is guilty.

Why is podophyllum called vegetable mercury? Because it resembles calomel in its action.

Why must the mixture of acids be cooled before putting in the cotton, in making pyroxylin? Because heat causes the formation of higher nitrates of cellulose which are less soluble in alcohol and ether and more explosive.

Why should the bark of rhamnus purshiana be

one or more years old before using? When fresh it contains a principle that causes griping, but after standing for a time this principle disappears and the bark no longer gripes.

Why should red rose flowers be gathered before complete maturity and dried rapidly? Collecting early makes them more astringent, and drying rapidly preserves the color and odor.

Why should santonin and preparations containing it be put into containers which protect it from the light? Light causes santonin to become yellow.

Why is santonin better than the sodium santoninate which was formerly official? Because it is not so soluble, so irritating, or so readily absorbed.

Why should mustard not be heated over 60° C. in making mustard poultice? A heat of 65° C. makes the ferment, myrosin, inert so that it does not convert the glucoside, sinigrin, into the volatile oil.

Why should powdered mustard not give a blue color with iodine? A blue color would indicate the presence of starch as an adulterant; mustard does not contain starch when pure.

Why should only black mustard be used in pharmacy? It yields the volatile oil of mustard while the white mustard does not.

Why do ribbons of tragacanth have longitudinal ridges on them? Tragacanth exudes at night through incisions made in the bark. The exudation ceases during the day and the juice dries, and the

ridge indicates the amount secreted in the twenty-four hours.

Why is ginger washed in boiling water? To prevent it from germinating.

Why is ginger coated with lime? To protect it from insects.

ALKALOIDS. DRUG ASSAYS.

Why was the term "alkaloid" applied to the basic principles found in plants? Alkaloid means alkali-like—*i.e.*, these principles, like alkalies, combine with acids to form salts.

Why is the definition, "An alkaloid is an organic base found in the plant kingdom, and which is a pyridin derivative," not generally acceptable? Because this shuts out at least two principles now classed as alkaloids, viz., caffeine and theobromine.

Why does the prefix "hydro" generally enter into the name of an alkaloidal salt? In forming a salt of an alkaloid, the hydrogen of the acid is not displaced; the whole acid is added on, and the prefix shows this.

Why should alkaloids be protected from the light? Light often decomposes alkaloids, slowly causing a darkening.

Why is less dependence now placed on chemical tests for alkaloids than formerly? We now know that many synthetic bases and ptomaines give reactions similar to, if not identical with, those given by alkaloids.

Why is the complete separation and estimation of alkaloids so difficult? Alkaloids frequently do not form compounds with any known reagent that are sufficiently insoluble to permit of separation.

Why is the general method of estimating alkaloids by weighing the free alkaloid objectionable? If the alkaloid is first precipitated, the mother liquid will hold more or less of it in solution, and the alkaloid will rarely come down pure. If the alkaloid is removed by dissolving it in some immiscible solvent, it will be mixed with some foreign matter.

Why is the general method of estimating alkaloids by precipitation with Mayer's reagent, and then weighing the precipitate, objectionable? The compound formed between the alkaloid and the reagent may vary under different conditions of precipitation. Drying this compound may change its composition. Mayer's reagent precipitates many other substances.

Why is the method of estimating alkaloids by a standard solution of Mayer's reagent objectionable? It is very difficult to tell when the end reaction is obtained, and the amount required varies with the concentration of the alkaloidal solution, as well as with other conditions.

Why is the method of estimating alkaloids by standard acid and alkali solutions objectionable? Many times it is difficult to detect the end reaction, and various indicators act differently with alkaloids. By precipitating the alkaloid from an acid solution

by iodine, filtering, and titrating the filtrate the end reaction is more distinct.

Why, in extracting alkaloids for assaying, are acidulated water and alkaline immiscible solvents alternately used? The separation of alkaloids by this method depends upon the facts that free alkaloids are generally soluble in immiscible solvents and insoluble in water, and the alkaloidal salts are soluble in water and insoluble in the immiscible solvents.

Why should such alkaloids as atropine, aconitine, hyoscyamine, and cocaine not be left in an alkaline solution any longer than is necessary in separating them from the crude drugs? They are all easily decomposed by simple contact with an alkali for a short time.

Why should cinchona be in very fine powder for assay purposes? The bark is hard to exhaust.

Why is a mixture of ether, chloroform, and ammonia used to extract the alkaloids in assaying the bark? Ammonia liberates the alkaloids, which are then dissolved in chloroform and ether.

Why should care be taken to measure accurately and to allow no evaporation of this liquid? 150 cc. are used to extract the drug, and 100 cc. of this are taken to represent two thirds of the drug taken. If evaporation is allowed, 100 cc. will represent more than 10 grams.

Why are the 100 cc. treated with dilute sulphuric acid? Acid converts the alkaloids into sulphates which are soluble.

Why is the acid fluid shaken with ammonia, ether, and chloroform in estimating anhydrous alkaloids? Ammonia liberates the alkaloids; and the ether and chloroform dissolve them.

Why "add 3 cc. of ether to the dry residue and evaporate again"? To aid the complete removal of moisture.

Why is quinine (free alkaloid) mixed with ammonium sulphate and water, and then dried, in the official method of testing quinine for other cinchona alkaloids? In order to convert all the alkaloids into sulphates, ammonia being volatilized.

Why are the alkaloids converted into sulphates? Because quinine sulphate is more insoluble in water than the other sulphates, and treating this mixture with water dissolves most of the sulphates of alkaloids other than quinine and comparatively little of the quinine sulphate.

Why is the mixture of cinchona alkaliods digested with water at 65° C. then kept at a temperature of 15° C. for two hours and filtered at that temperature? When quinine sulphate is crystallized from a liquid containing other alkaloids the crystals seem to take in some of the other alkaloids (they are inside the crystals, not merely on the outside). The elevated temperature is for the purpose of dissolving more of the quinine. The mixture is cooled to 15° C. and filtered at that temperature in order to get uniform results and prevent too much quinine sulphate from going into solution;

excess of quinine is not dissolved by ammonia. The mixture is kept at 15° C. for two hours before filtering so as to allow complete crystallization, getting only a saturated filtrate.

Why is ammonia added to the filtrate? By adding the stated amount of ammonia to the given amount of filtrate, enough ammonia is added to liberate all of the alkaloids and to redissolve the quinine which is present, but not the other alkaloids. The test is based on two principles: (1) the comparative solubility of the sulphates of alkaloids other than quinine in water, and (2) the comparative insolubility of these alkaloids in ammonia when in the free state.

Why are the other salts of quinine converted into the sulphate in applying this test? To get uniform results and to fulfil the condition as laid down in the first principle.

Why is quinine tannate nearly tasteless? Because it is so nearly insoluble.

Why is nitric acid used in estimating strychnine in nux vomica and its preparations? Nitric acid decomposes brucine which is extracted with the strychnine and changes it so that chloroform no longer dissolves it from an alkaline solution.

Why is the filter wetted with chloroform just before filtering the chloroform extract of the mixture after treating with nitric acid? So that the filter will not retain any strychnine and to prevent any aqueous solution from getting into the flask.

Why is it particularly objectionable to have any of the aqueous liquid get into the flask at this stage of the process? The aqueous liquid contains free alkali which would neutralize some of the standard acid, acting like strychnine.

Why is fiftieth-normal potassium hydroxide used to titrate back the excess of decinormal acid? Rather more accurate results can be obtained than when decinormal alkali is used.

Why divide the number of cubic centimeters of fiftieth-normal potassium hydroxide by 5? So as to reduce the fiftieth-normal to its equivalent in decinormal.

Why subtract this quotient from 10? 10 cc. of decinormal acid were used at first. Subtracting the above quotient from 10, the remainder is the number of cubic centimeters of acid which were taken up or neutralized by the alkaloids.

Why multiply the remainder by 0.0332? Each cubic centimeter of decinormal acid neutralizes 0.0332 gram of strychnine.

Why is this product multiplied by 50? The assay method gets the alkaloid in 2 grams of extract, and by multiplying by 50 gives the weight in 100 grams.

Why is it difficult to tell when the acid is exactly neutralized by the alkali? The liquid which is to be titrated is often colored. It is better to add neutral Mayer's reagent, or a solution of iodine, to the acid solution, filter, and then titrate the filtrate with the alkali.

Why is manganese dioxide preferred by some workers to potassium dichromate, in testing for strychnine? Potassium dichromate itself gives a color that may hide the strychnine color if strychnine is present in only small amounts.

Why is powdered opium better for making preparations than the gum? It is more uniform and does not change so much on keeping.

Why is it that water will exhaust opium when it will exhaust almost no other alkaloidal drug? The alkaloids of opium exist in the form of meconates and sulphates, which are soluble, while in most other drugs the alkaloids are in combination with tannic acid, which salts are nearly insoluble.

Why, in assaying gum opium, should a cone-shaped piece be taken with the apex of the cone at the center of the lump? The outside of the lump is always dryer than the center, and by taking a cone a proportional amount of the dry and the moist opium is obtained.

Why, in the official method of estimating opium, is an Erlenmeyer flask directed to be used? The crystals can be removed more easily. The writer prefers a Florence or globe-shaped flask, because there is less area of surface when decanting the ether, and consequently the ether can be more closely separated.

Why are alcohol, ether, and ammonia added to the concentrated extract of opium in assaying it? The alcohol prevents the precipitation of a considerable amount of foreign matter by ammonia.

Ether keeps in solution the alkaloids other than morphine, they being soluble in ether while morphine is not. Ammonia liberates the alkaloids from their salts and morphine is precipitated. The aqueous extract is concentrated so that as little morphine will be left in the mother-liquor as possible.

Why does the U. S. P. direct to shake this mixture for ten minutes? Agitation aids precipitation, making the morphine come down more promptly and completely. Even then the mixture must stand six hours or more.

Why should the mixture not stand longer than about twenty-four hours? After that time other matter than morphine precipitates.

Why does the U. S. P. direct two rapidly acting filters? Two filter-papers are used to quicken filtration. The writer much prefers a single filter of hardened paper from which the crystals can be readily removed without leaving any on the paper, or getting fibers of paper mixed with the crystals.

Why are the contents of the flask washed twice with ether? So as to remove other alkaloids as far as possible.

Why are the crystals washed with alcohol saturated with morphine? They are washed with alcohol to remove coloring and other foreign matter. The alcohol is saturated with morphine so that it will not dissolve any of the crystals.

Why is the alcohol saturated with morphine washed out with ether? If the alcohol were not

washed out it would evaporate, leaving the morphine originally dissolved in it, making the results too high.

Why are the crystals dried at a temperature not exceeding 60° C.? If the crystals were dried at 100° C. part but not all of the water of crystallization would be driven off, the amount varying. A higher temperature is necessary to drive off all the water, and there is some danger of the decomposition of morphine. Morphine crystallizes and is weighed with one molecule of water.

Why are the crystals transferred to a watch-glass for weighing? They cannot be weighed accurately on filter-paper, since filter-paper absorbs moisture during weighing. Then, too, filter-paper loses some weight on being subjected to various solvents.

Why is lime water used in assaying opium? It is used to dissolve morphine, leaving some impurities undissolved, which are filtered out.

Why is the use of lime water objectionable? The filter-papers, though counterpoised at first, do not necessarily retain the same amount of calcium hydroxide; then more or less of the hydroxide is converted into the carbonate. This variation in amount of lime in the two papers is liable to cause serious error. Moreover, experiments made by the writer indicate that though two filter-papers are treated by the same liquid they do not always change the same.

Why, in estimating morphine in tincture of

opium, is the tincture evaporated? To get rid of the alcohol, and to concentrate the liquid.

Why, in estimating morphine in laudanum, is water added to the concentrated tincture? To precipitate resinous matter.

Why, in estimating morphine in laudanum, does a precipitate sometimes form on evaporating the filtrate to the 14 grams? The precipitate is probably narcotine. Narcotine exists in opium loosely combined with an acid, and the heat during evaporation decomposes the salt, liberating narcotine which is insoluble in water.

Why is morphine more bitter when combined with a common acid than when free? It is more soluble.

Why does morphine acetate become less soluble with age? It loses acetic acid, leaving the free alkaloid.

Why should the solution of ferric chloride used in testing morphine be nearly neutral? Any excess of acid destroys or prevents the coloration.

Why does Froehde's reagent (ammonium molybdate in sulphuric acid) give a blue color with morphine? Morphine reduces molybdic acid to lower oxides of the metal.

Why does iodic acid with starch and morphine give a blue color? Morphine reduces iodic acid, liberating iodine which gives a blue compound with starch.

Why was the alkaloid narcotine given that name? It was thought at first to be the narcotic principle of opium.

Why is the finding of meconic acid of any importance in a case of toxicology? It indicates that opium and not pure morphine was taken.

Why is the gravimetric method of assaying aconite objectionable? Aconite contains several alkaloids that can be put into two classes, the aconitine alkaloids and the aconine alkaloids, the former being active and the latter nearly inert. The aconitine alkaloids are converted to some extent into the aconine compounds in drying the drug, and by heat and alkalies during the process of assay; and though a large amount of alkaloids are obtained a variable proportion of them is inert.

Why should the use of aconitine be discouraged? The commercial article is extremely variable, and absolute aconitine is one of the most active of drugs.

Why does the U. S. P. direct that the containers for apomorphine hydrochloride be previously rinsed with hydrochloric acid? Glass bottles are frequently sufficiently alkaline to render the contents somewhat alkaline, and this tends to decompose the apomorphine.

Why is no acid used in assaying colchicum? The alkaloid is easily decomposed by acids, often forming colored compounds. The acid is not necessary as the alkaloid is soluble in about 22 parts of water.

Why is acid added to the ethereal solution before evaporating in assaying conium? To prevent the vaporization of coniine, which is a volatile alkaloid.

Why is hydrastine called "white alkaloid"? In order to distinguish it from berberine, the "yellow alkaloid". Berberine was separated before hydrastine, and it was first called hydrastine.

Why is pilocarpine preferable to pilocarpus? It is more uniform in strength. Pilocarpus contains another alkaloid, jaborine, which is antagonistic to pilocarpine.

Why does physostigma vary so much in activity? It contains two alkaloids, physostigmine and calabarine, which vary in proportion and are antagonistic to each other.

Why is sodium bicarbonate used instead of ammonia in assaying physostigma? The bicarbonate is less alkaline and physostigmine is easily decomposed by alkalies, forming colored compounds.

Why is ether added to the solution just before titrating back the excess of acid in assaying physostigma? The indicator, iodeosin, acts better in the presence of ether.

Why is a trace of hypophosphorous acid sometimes added to a solution of physostigmine salicylate? Unless protected the solution soon becomes red-blue, due to the formation of rubeserin. One part of dilute hypophosphorous acid to five hundred of solution is said to be sufficient to keep it.

Why should the use of official veratrine be discouraged? It is a mixture of alkaloids and varies in proportion to its different ingredients.

PRESCRIPTIONS.

Why should prescriptions be written in Latin? (1) It is a language understood throughout the world. (2) It is a dead language, and therefore is not changing. (3) Common names vary in different parts of the country, while Latin ones are distinctive. (4) Technical Latin is not usually understood by the patient, and so there is not the danger of arousing prejudice. (5) The tendency to self-medication is not increased.

Why should the physician sign his full name to a prescription and not simply his initials? It sometimes happens that the prescriber has made a mistake, or for other reasons the compounder wants to communicate with the writer, and in a large town the prescription may be carried to a part where the prescriber is not known.

Why is "℞" placed at the head of prescription blanks? It stands for the verb "recipe," meaning to take. Originally the sign of Jupiter, ♃, was used as a prayer asking for healing.

Why do many pharmacists write the label before

filling the prescription? The label has time to become thoroughly dry, and they have time to consider the best way of filling it.

Why should the pharmacist notice carefully the doses of all strong medicines when they are prescribed? The physician is human and liable to make an error. In law the pharmacist as well as the physician is held responsible in case injury results from an overdose, and suit for damages is more likely to be brought against the pharmacist than the physician.

Why should the directions, " Use as directed," be avoided by the prescriber? The patient is generally in a more or less nervous condition and likely to forget the details. Then, too, by having the directions on the prescription it makes another safeguard in that the pharmacist can more readily detect an error if present. Upon the dose depends the safety.

Why is there a direct loss in buying such chemicals as morphine and strychnine in one eighth ounce bottles and selling it by the grain unless the price is advanced more than enough to cover the apparent cost of selling? The substance is bought by avoirdupois weight, which has only 54.7 grains in one eighth of an ounce, while it is sold by apothecary weight, which has 60 grains in an eighth of an ounce.

Why is there a loss in buying quinine sulphate in bulk and retailing it in small amounts? This

salt loses a considerable amount of water of crystallization, and more quinine is sold for a given weight than is bought.

Why should heat not be generally used in making solutions at the prescription counter? Heat may volatilize or decompose some ingredient or make a supersaturated solution that will deposit large crystals on cooling.

Why is it usually preferable, in mixing an insoluble substance with a liquid, to rub it in the mortar with a small amount of liquid first? If the solid is simply put into a bottle and shaken the substance may "lump" and require time and agitation in order to get it mixed. This is particularly true with calomel, magnesia, sulphur, or a vegetable drug.

Why is it frequently preferable, in mixing solutions that will precipitate, to have the solutions cold and as dilute as possible before mixing them? The precipitate will be finer, lighter, and more easily diffused through the liquid.

Why should heat not be used in making solutions of alkali bicarbonates? Heat decomposes them, liberating carbon dioxide and leaving the normal carbonate.

Why should ammonium carbonate be dissolved in the cold? Heat volatilizes ammonia and carbon dioxide.

Why is it generally best, when necessary to mix them, to add an alcoholic solution of a substance insoluble in water, to the water, rather than the water

to the alcohol? The substance is precipitated in a finer form and is more easily diffused. However, in some cases where there is a comparatively large amount of alcohol, and a small amount of precipitation, it is better to add the water to the alcoholic solution.

Why should a stock solution of mercuric chloride contain a little ammonium chloride? Ammonium chloride prevents the reduction that slowly takes place in a solution of pure mercuric chloride.

Why does ammonium chloride make mercuric chloride more soluble? Probably because a more soluble double compound is formed.

Why is citric or tartaric acid sometimes added to mercuric chloride tablets? To render the solution made from them more penetrating, by preventing the formation of an insoluble compound with albumin.

Why should potassium iodide not be kept long in stock solution? Iodine is liberated. This can be prevented to some extent by the presence of an alkali carbonate, but this is often objectionable.

Why should bicarbonates of alkalies not be kept in stock solutions? They lose carbon dioxide and become more alkaline.

Why should chloral hydrate not be kept in stock solution? It decomposes, becoming acid.

Why cannot hypodermic solutions be rendered aseptic by heat? Those medicinal substances which are usually administered hypodermically are more or less decomposed by heat.

Why cannot alcohol be used as a preservative for

hypodermic solutions? Comparatively large amounts of alcohol would be necessary to accomplish the purpose, and alcohol, when injected, is an irritant and astringent.

Why should mucilage of acacia not be used to suspend insoluble substances in lotions? It leaves the skin sticky or hard. Tragacanth is less objectionable, as a much smaller amount will serve the same purpose.

Why are acacia and tragacanth objectionable in suspending bismuth subnitrate in a liquid? Tragacanth seems to combine with the bismuth salt, forming a curdy precipitate. When acacia is used and the bismuth settles, it is difficult and sometimes impossible to shake up. Scoville suggests the use of tragacanth with the addition of a little alcohol.

Why should eye-washes and hypodermic solutions be filtered? To be sure that no solid matter is left that would cause irritation.

Why cannot as much of certain powdered salts, such as alum or Rochelle salt, be dissolved in water as is the case with crystals? In the powdered condition the salt has lost some of its water of crystallization, and there is consequently more of the salt proper in a given weight than is the case with the crystals.

Why should such substances as calomel and ipecac be very finely divided? The finer the powders the more active they seem to be.

Why should the following substances not be dispensed in the form of a powder: Carbolic acid, cal-

cium bromide, iron and ammonium citrate, potassium acetate, potassium carbonate, potassium hypophosphite, sodium hypophosphite, potassium iodide, sodium iodide, strontium bromide, granular effervescing salts, and sodium bromide? They are hygroscopic or deliquescent.

Why should the following substances not be dispensed in the form of powders: Ferrous sulphate, lead acetate, sodium carbonate, sodium sulphate, sodium phosphate, and zinc acetate? They lose water of crystallization and become more concentrated.

Why should the following substances not be dispensed in the form of powders: Ammonium carbonate, chloral, lead acetate, camphor, the iodides of mercury, and the salts of silver? Ammonium carbonate loses ammonia and carbon dioxide; chloral is irritating; lead acetate loses acetic acid and becomes insoluble; the iodides of mercury darken; camphor volatilizes; and the silver salts are reduced.

Why should the following substances not be prescribed together in the form of powders: Antipyrine with carbolic acid, resorcin, or thymol; camphor with carbolic acid, chloral hydrate, menthol, naphtol, resorcin, salol, or thymol; chloral with euphorin, exalgin, phenacetin, menthol, salol, or thymol? They liquefy or form soft masses.

Why is it that a good many crystalline compounds liquefy when rubbed together? Heat of trituration may be sufficient to start chemical reaction, forming

liquid compounds in some cases, and water of crystallization may be liberated in other cases.

Why should chlorates, permanganates, silver oxide, chromates, or nitrates not be rubbed with organic matter or other reducing matter? Because the liberation of a large amount of gas will cause an explosion.

Why should solutions containing potent substances like strychnine be filtered before dispensing? To be certain that none is left undissolved, avoiding danger of an overdose at the last of the prescription.

Why is the presence of alcohol often advisable when an alkaloid salt is prescribed with other compounds? A large number of compounds precipitate alkaloids; alcohol frequently prevents this precipitation.

Why should a mixture of mercuric chloride and potassium iodide not be given with an aqueous solution of an alkaloidal salt? Mercuric chloride and potassium iodide cause the formation first of mercuric iodide and potassium chloride. Then the mercuric iodide combines with more potassium iodide, forming Mayer's reagent (potassium mercuric iodide), which precipitates alkaloids. Even when the precipitated alkaloid is harmless, the mixture may be dangerous on account of the mercuric compound which is precipitated.

Why is more carbon dioxide given off when a carbonate is mixed with a solution of a salt of tin, antimony, ferric iron and aluminium than when mixed with salts of other metals (not considering the presence of a free acid)? The carbonate forms hydrox-

ides or oxides with these metallic salts, practically all of the carbon dioxide being eliminated. With the other metallic salts it forms a normal or basic carbonate.

Why is honey a good addition to mixtures calling for tincture of myrrh and aqueous solutions? Water usually precipitates resin of myrrh in a form that soon sticks together and adheres to the sides of the bottle. Honey does not prevent precipitation, but holds the resin in a flocculent condition, so that it is easily suspended.

Why is a mixture of lead water and laudanum a poor combination pharmaceutically? Lead subacetate combines with sulphuric acid, meconic acid, and the alkaloids in opium, forming insoluble compounds with all of them.

Why does effervescence take place when ammonium carbonate is added to syrup of garlic, ipecac, or squill? These syrups contain free acetic acid, which reacts with the carbonate.

Why does the variation in the order of mixing potassium chlorate, hydrochloric acid, and water cause a variation in color? Adding hydrochloric acid to the chlorate and then adding water gives a yellow-green solution, due to the chlorine formed. Adding water to the chlorate or to hydrochloric acid, and then adding the remaining ingredient, gives a colorless solution. There is not nearly as much chlorine formed by this as by the first method.

Why should glycerin be added to a mixture of

carbolic acid and water when the proportion of acid to water is much greater than 1 to 15? Carbolic acid separates from the mixture when the proportion is much above this, and the glycerin prevents separation.

Why should care be used in prescribing antipyrine in combination with other compounds? Antipyrine resembles alkaloids in its precipitations, being thrown out of solution by about the same substances that precipitate alkaloids.

Why does a mixture of fluid extract of gelsemium, chloral hydrate, antipyrine, and water separate into layers? Antipyrine and chloral hydrate form one or more chloral-antipyrines which are liquid at first but may become solid. One of these compounds is hypnal. Antipyrine liquefies with quite a large number of compounds.

Why should gold and sodium chloride not be put into the same prescription with potassium iodide? Decomposition takes place, with the formation of different compounds, depending on the excess of the one or the other salt. Potassium iodide is usually in excess and auric iodide is formed, changing to aurous iodide.

Why should ichthyol not be given with anything that is acid? Acids combine with ammonia in ichthyol and precipitate ichthyosulphonic acid as a dark, resinous, adhesive mass.

Why is spirit of nitrous ether and potassium iodide a dangerous combination? Iodine is liber-

ated and oxides of nitrogen are given off. The presence of an acid increases the reaction, while an alkali diminishes or retards it.

Why does spirit of nitrous ether give a green color with antipyrine? The green isonitroso-antipyrine is formed and is precipitated from concentrated solutions. The compound is not now regarded as poisonous. Alkali carbonates retard the reaction.

Why should prescriptions calling for spirit of nitrous ether and drugs containing considerable tannic acid not be dispensed as soon as they are mixed? Tannic acid decomposes ethyl nitrite or nitrous acid, liberating oxides of nitrogen. The reaction may take place slowly, and if the bottle is stoppered, sufficient pressure may be formed to burst it.

Why does an effervescence occur when spirit of nitrous ether is added to a solution of potassium acetate or other similar soluble salt? The effervescence is probably due to the throwing of the ethyl nitrite out of solution, when it is easily volatilized.

Why does a mixture of spirit of nitrous ether, potassium citrate, and water separate into two layers? Potassium citrate has a strong affinity for water and is insoluble in alcohol. Alcohol tends to throw it out of solution, but it retains enough of water to keep it a liquid.

Why is a mixture of ammonium acetate and spirit of nitrous ether a good combination? Because

as soon as the nitrous radical is liberated from ethyl nitrite it combines with the ammonia of ammonium acetate and forms ammonium nitrite, which is nearly as active.

Why is an amber bottle better than a blue bottle for silver nitrate solutions? It gives protection from the light as well, and the contents can be more readily seen.

Why should sodium phosphate not be given with alkaloidal or neutral metallic salts? The official phosphate is a little alkaline and liberates the alkaloid or forms an insoluble compound with the metal. When prescribed in such combination it should first be neutralized.

Why does an alkali citrate increase the solubility of benzoic and salicylic acids? A partial decomposition probably results and some alkali benzoate and salicylate are formed; and these, as well as the citric acid liberated, are soluble in water.

Why does an alkali citrate often increase the solubility of a metallic salt? Alkali citrates often form double compounds with metallic salts and such compounds are soluble.

Why does a mixture of borax and zinc sulphate liquefy when rubbed together? Both salts contain large amounts of water of crystallization which is liberated by the chemical reaction induced by the rubbing.

Why will one compounder get a white precipitate, and another one a clear solution, in filling a pre-

scription calling for magnesium carbonate, 1½ dr.; borax and citric acid, each 2 dr.; water, enough to make 8 fl. oz.? By adding the carbonate to the acid and water, a clear solution results from which borax causes no precipitation. By adding borax to acid and water, a clear solution results, but the carbonate does not dissolve in it because the borax largely neutralizes the acid.

Why does the addition of hydrocyanic acid to a mixture of codeine, tincture of iodine, and water dissolve the precipitate and give a colorless solution? The precipitate present is a compound of iodine and codeine, and the color is due to iodine. Hydrocyanic acid reduces iodine to an iodide, thus destroying the color and breaking up the precipitate.

Why does a mixture of silver nitrate, cocaine, and water give a black precipitate? Cocaine takes away the nitric acid, precipitating silver as the oxide. If cocaine hydrochloride is used a white precipitate of silver chloride is formed. Cocaine nitrate should be used.

Why should quinine sulphate be rubbed in a mortar before being put into capsules? It becomes less bulky.

Why does quinine sulphate, potassium acetate, and water make a thick mixture? Reaction takes place and quinine acetate is probably formed, although some recent experimenters claim that quinine hydrate, acetic acid, and potassium sul-

phate are formed, and it is the quinine hydrate that makes the mixture so nearly solid.

Why should care be used in combining quinine sulphate and potassium iodide in the same mixture? Quite frequently an acid is present, and if so it dissolves the quinine sulphate. Potassium iodide precipitates a concentrated solution of a quinine salt. The acid liberates hydriodic acid, which is easily oxidized by the air, liberating iodine. Iodine gives a purplish-red precipitate with quinine.

Why, in mixing a carbonate or hydroxide with quinine sulphate, should the solutions be dilute and cold? The free alkaloid will be liberated, and unless precipitated under the above conditions it is likely to come down as a sticky mass.

Why do two substances precipitate when sodium benzoate is added to an acid solution of quinine sulphate? Quinine benzoate is precipitated, and benzoic acid is liberated and precipitated.

Why does the addition of quinine sulphate to tincture of the chloride of iron sometimes give a yellow-brown precipitate? Quinine sulphate takes up the free acid to form a soluble compound and so weakens the acid of the tincture that a basic chloride of iron is precipitated. The addition of more acid prevents this precipitation.

Why is quinine bisulphate better than the sulphate in making pills? It is less bulky.

Why should acid not be used to get quinine sulphate into solution when fluid extract of licorice

is used to cover up the bitter taste? The acid breaks up the ammonium glycyrrhizate and destroys the sweet taste, precipitating the bitter glycyrrhizic acid. It is better to leave out the acid and dispense the prescription as a shake mixture.

Why does a mixture of glycerin, borax, and water give an acid solution? Borax and glycerin combine to form sodium metaborate and glyceryl borate. The latter compound is decomposed by water, forming glycerin and boric acid; the solution is thus made acid.

Why does borax precipitate neutral solutions of metallic and alkaloidal salts? Borax is quite strongly alkaline and causes precipitation on this account. Sometimes the addition of a little glycerin is allowable and will prevent precipitation.

Why does a mixture of mercuric chloride and tartar emetic give a white precipitate? Tartar emetic reduces mercuric chloride to calomel.

Why does a mixture of sodium bromide, antipyrine, camphor, and caffeine citrate, when put into capsules, liquefy the capsule? The chief ingredient concerned is sodium bromide which absorbs sufficient water to cause the trouble. Some drying powder should be used.

Why does a mixture of sodium salicylate, citrated caffeine, antipyrine, and syrup of orange give a white precipitate? In a strong solution sodium salicylate may precipitate antipyrine, and the citric acid in citrated caffeine liberates salicylic acid, which is only sparingly soluble.

Why should bismuth subnitrate and a carbonate or bicarbonate not be prescribed together in aqueous mixture? Water liberates nitric acid from the bismuth salt, making a more basic salt; and the nitric acid in turn liberates carbon dioxide. The bismuth salt is converted into a basic bismuth carbonate The evolution of carbon dioxide is slow and may be sufficient to burst the bottle after it has been received by the patient. These reactions may be hurried by warming the mixture. Some dispensers use bismuth subcarbonate at once instead of waiting for it to be formed as the result of the reaction.

Why does a change in the color of the precipitate occur when bismuth subnitrate and potassium iodide are mixed with water? Different basic iodides of bismuth are formed, varying in color from brown to red and gray.

Why does bismuth subnitrate, when mixed with potassium hypophosphite and water, change in color? The hypophosphite reduces the bismuth, forming black insoluble compounds.

Why does an acid, when added to a solution of bismuth and ammonium citrate, give a white precipitate? The acid combines with the ammonia and sets free the insoluble bismuth citrate.

Why is difficulty experienced in making suppositories containing chloral hydrate? Chloral hydrate seems to have a liquefying action on oil of theobroma somewhat similar to its action on camphor. Several other compounds have a similar effect.

Why does a mixture of alcohol, chloral hydrate, and water sometimes separate into two layers and sometimes not? Chloral hydrate combines with alcohol, forming chloral alcoholate; this is soluble in alcohol, but not in water, and is somewhat soluble in a mixture of alcohol and water. If chloral is present in comparatively large amounts, and alcohol in small amounts, there is more danger of separation. Soluble salts, such as potassium bromide, tend to cause separation.

Why should scale salts of iron not be powdered before being dissolved in water? It makes the powdered salt form a sticky mass that dissolves slowly. Warm water is better than cold. Boiling water may reduce the ferric to ferrous to some extent.

Why should scale salts of iron not be shaken much with water? A foam is formed that is quite persistent.

Why is it necessary to add but little water when sulphate of iron and potassium bromide are rubbed together in making pills of ferrous bromide? Reaction takes place, liberating a considerable amount of water of crystallization.

Why does iodine lose its therapeutic effect when it is given with drugs containing much tannic acid? In the presence of water iodine combines with some tannic acid and with the hydrogen of the water. The oxygen of the water makes an insoluble compound with more tannin.

Why does a mixture of iodine and ammonia not

have the same effect that they do when applied separately? Iodine combines with ammonia, forming chiefly ammonium iodide with a little iodate. Explosive iodide of nitrogen is formed under certain conditions.

Why should iodine not be given with oil of turpentine? If the two are mixed together violent chemical reaction results. Moreover, the iodine probably does not have the same effect therapeutically as before.

Why should Fowler's solution be neutralized previous to mixing with a solution of a ferric salt? It is alkaline, and if present in sufficient amount it will precipitate ferric hydroxide, which will in turn precipitate potassium arsenite.

Why should Fowler's solution not be prescribed with a solution of mercuric chloride? It reduces mercuric chloride to calomel, and if present in sufficient amount, to metallic mercury also. Acidifying the Fowler's solution will prevent this.

Why should Fowler's solution not be prescribed with a solution of an alkaloidal salt? Being alkaline, it liberates the alkaloid which is precipitated. Fowler's solution should be neutralized before using.

Why does citric acid prevent the precipitation of iron salts by ammonium hydroxide? It forms double compounds which are soluble.

Why does phosphoric acid prevent the black color which usually results in combining tannic acid and a ferric salt? Phosphoric acid seems to have a stronger

affinity for iron than tannic acid has, and thus displaces it.

Why should tincture of ferric chloride and potassium iodide never be given in the same prescription? Iodine is liberated, and if all of the iodide is decomposed, iodine will be precipitated. Ferric chloride is reduced to ferrous chloride.

Why are syrup of iodide of iron and potassium chlorate dangerous when prescribed together? Iodine is liberated even in neutral mixtures. Adding a little ammonia prevents this liberation for a time only and will cause precipitation of the iron.

Why do dilute solutions of carbolic acid and ferric salts sometimes fail to give a violet coloration? Organic matter and some neutral salts interfere.

Why should mucilage of acacia and solution or tincture of ferric chloride be well diluted before being mixed? Ferric salts will gelatinize mucilage of acacia unless in dilute solutions. Alkali citrates prevent gelatinization.

Why may alkali hydroxides or carbonates be given with ferric chloride without apparent incompatibility if sugar, glycerin, citrates, tartrates and some other substances are present? Because these substances hold ferric hydroxide in solution.

Why does phosphoric acid precipitate a solution of soluble phosphate of iron? Soluble phosphate of iron may be a double compound of ferric phosphate and sodium citrate, or it may be a mixture of these, the ferric phosphate being soluble in the citrate.

Phosphoric acid may break up the double compound or then decompose sodium citrate, forming a compound which no longer acts as a solvent. The remedy is to use metaphosphoric acid, free from ortho- or pyro-acid, in the place of the official acid. Strong official phosphoric acid will also dissolve the precipitate. Sometimes dilute phosphoric acid will not cause precipitation.

Why does calomel with potassium hypophosphite turn dark? Because the hypophosphite reduces the calomel to metallic mercury.

Why does a mixture of soap and calomel turn dark? Soap is alkaline and hence causes the formation of some black oxide of mercury.

Why must calomel and potassium iodide not be given together unless the calomel is in small amounts? Potassium iodide with calomel first forms mercurous iodide and potassium chloride. Mercurous iodide, with more potassium iodide, is decomposed, forming mercuric iodide and metallic mercury. Mercuric iodide combines with more potassium iodide, forming the nearly colorless and soluble potassium-mercuric iodide, which is as active as mercuric chloride.

Why should antipyrine not be given with calomel? Part of the calomel is changed to metallic mercury, and part is changed to the mercuric salt, which is active. This reaction is more likely to take place in the presence of sodium bicarbonate.

Why should glycerin be diluted before applying to the hands? It is hygroscopic and absorbs moisture

from the skin if it is not diluted, making the skin hard and rough.

Why should castor oil not be taken with oleoresin of male fern? It seems to increase the absorption of filicic acid and may cause symptoms of poisoning.

Why is it best to spread a little olive oil over the surface of a linseed poultice? It prevents the poultice from becoming hard and sticking to the skin.

Why should preparations of iron be taken through a glass tube? Most preparations of iron contain acid which acts on the enamel of the teeth. There is often a little sulphide around the teeth and this gives a sulphide of iron which darkens the teeth.

Why is ferric hydroxide not precipitated from ferric salts in the alkaline contents of the intestine? The gases and the organic matter present keep it in solution.

Why should arsenic be given after a meal? So as to dilute it with the food and prevent its irritating effect.

Why is the administration of calomel often followed by a dose of black draught? Calomel acts on the upper portion of the intestine and black draught on the lower portion.

Why does the administration of most organic acids render the urine alkaline? The acids are eliminated in the urine as carbonates.

Why does benzoic acid make the urine acid? It is eliminated in the urine as hippuric acid.

Why is iodoform an antiseptic when used in clinics but not when experimented with in the test-tube? Applied to the living tissue it is probably dissolved by the fluids and decomposed by the living cells. In the test-tube these conditions do not exist.

Why should prescriptions containing chloral, morphine, or cocaine never be refilled without the physician's consent? There is danger of the patient forming a habit.

Why are morphine and atropine sometimes given together although they are somewhat antagonistic in physiological action? When given together the atropine is in small amounts, and in such a combination it relieves indigestion and cardiac depression.

Why are direct emetics of but little service in cases of poisoning by anæsthetics, such as carbolic acid and cocaine? Direct emetics act by irritating the walls of the stomach, and if the walls are anæsthetized they will have but little effect.

Why should the stomach-pump be used with care, if used at all, in cases of poisoning by alkalies or acids? Alkalies and acids often corrode the walls of the esophagus, weakening it, so that there is danger of puncturing it with the tube of the pump.

Why should oils not be given as demulcents after phosphorus poisoning? Oils aid the solution and the action of phosphorus. Old oil of turpentine has been recommended because it contains ozone, which has an oxidizing effect on the phosphorus.

Why is charcoal used as an antidote for poisoning by alkaloids, phosphorus, and many metallic salts? It has the property of absorbing these substances and holding them.

Why are sulphates given in case of poisoning by carbolic acid? They convert the acid into sulphocarbolates which are much less poisonous.

Why is alcohol given for poisoning by carbolic acid? It antidotes the action of carbolic acid, but it is not known whether it is a chemical or a physiological antidote.

Why is albumin a good antidote for poisoning by metallic salts? It forms insoluble compounds with most metallic salts, but these should be removed as quickly as possible as they are slowly absorbed. In case of poisoning by corrosive sublimate too much albumin redissolves the compound.

MISCELLANEOUS.

Why do drops of liquids vary so much in size? The size depends upon the shape and size of the vessel from which dropped, upon adhesion, cohesion, rapidity of flow, and viscosity.

Why is a drop of liquid from a curved eye-dropper larger than one from a straight dropper having the same size opening? The straight one is generally held at an angle so that the drop falls from one side of the orifice; but with a curved dropper the drop falls from the whole circle of the orifice.

Why is the center of gravity of the beam of a balance below the fulcrum? If the two coincided the beam would stay in any position in which it is placed. If the center of gravity is above the fulcrum the beam will tend to turn over.

Why is the center of gravity of the beam of a balance, compared with the fulcrum, lower in a balance intended for heavy weights than it is in more delicate balances? The nearer the center of gravity approaches the edge of the fulcrum the more accurate will it be, the slower to oscillate, and the lighter the weight that will start it.

Why is an agate knife-edge better than a steel one? It is harder and does not corrode.

Why should a thermometer stand for two years before being graduated? To allow time for the glass to contract.

Why is mercury a good fluid for a thermometer? It can be reduced to a comparatively low temperature without solidifying, will record a comparatively high temperature, does not adhere to the sides of the tube, possesses a uniform rate of expansion for each increment of heat, and has great conducting power.

Why should the bulb of the thermometer be a little above the liquid in determining the boiling-point of the liquid? If placed in the liquid it will not show the exact boiling-point. The liquid is generally a little hotter.

Why is the bumping of a hot liquid relieved by putting in some irregular or angular substance? Such a substance aids the liberation and evolution of the vapor bubbles.

Why was the temperature of "25° C." adopted in the 8th revision of the U. S. P.? It comes nearer the ordinary temperature than 15° C. and can be more easily attained.

Why should a filter-paper never extend above the edge of the funnel? Capillary attraction causes the liquid to rise and crawl over the funnel; moreover, the paper cannot be readily washed under such circumstances.

Why should attention be given in buying funnels

to get those having an angle of sixty degrees? Many funnels do not have that angle, and filter-paper folded in the ordinary way makes an angle of sixty degrees.

Why is upward filtration sometimes preferable to downward filtration? By making a liquid pass upward through a filter, the solid matter does not become packed on the filter so much and clog filtration.

Why is 4° C. specified as the temperature at which 1 cc. shall weigh 1 gram? At 4° C. water has its maximum density, a given volume being lighter when either above or below 4° C.

Why does dissolving a solid in water produce cold? Heat is absorbed; active heat is changed to latent heat when a solid changes from such to a liquid condition unless there be chemical reaction.

Why does the solution of anhydrous salts in water produce heat? It is generally considered that chemical reaction takes place, the water of crystallization combining with the salt.

Why do some solids in dissolving produce more cold than others? Generally the more rapid the solution the greater the amount of cold produced.

Why does dissolving a gas in water produce a rise in temperature? When a gas changes to a liquid, latent heat is changed to active heat.

Why, in powdering a substance, is it better to remove the finer particles by frequent sifting? If the finer particles are left in they become more or less packed around the larger ones and protect them from being powdered.

Why does powdering a soluble substance aid its solution in a liquid? A greater surface is exposed to the solvent action of the liquid.

Why does stirring aid solution? The liquid in immediate contact with the solid becomes saturated, or nearly so, and stirring causes this to be displaced by liquid that is less saturated.

Why does heat generally aid solution? Heat causes greater molecular motion, favors molecular separation, and causes currents to be formed in the liquid.

Why is albumin used in clarifying liquids? Because it can be intimately mixed with the liquid, and then when it is coagulated it carries the suspended matter down with it.

Why does heating sometimes clarify a liquid? Heat coagulates albumin if present, and this acts mechanically in enveloping the suspended matter. Heat lessens the viscosity of the liquid, allowing the matter to separate more readily. The solid matter may also be carried to the top by the globules of vapor formed.

Why does fermentation sometimes clarify a liquid? If albumin is present it is coagulated by the alcohol and acid formed.

Why does rapidity of evaporation depend upon the extent of surface exposed to the air when a liquid is evaporated below its boiling-point? The formation of vapor takes place at the surface which is exposed to air.

Why does rapidity of evaporation depend upon the

extent of surface exposed to heat when a liquid is evaporated by boiling? The formation of vapor under such circumstances takes place chiefly at the surface exposed to heat.

Why do shallow vessels favor evaporation? There is less weight of liquid above the heat, and therefore less resistance to the escape of bubbles.

Why are stone vessels better than glass for crystallizing? The roughness of the surface favors crystallization.

Why should a precipitating jar be wider at the bottom than at the top? So that the precipitate on settling will not adhere to the sides of the jar.

Why is a non-luminous flame hotter than a luminous flame? In a non-luminous flame all of the carbon is consumed while it is not in a luminous flame.

Why is the cold water made to enter the lower opening of a Liebig condenser rather than the top? As water becomes heated it naturally rises and the cold water pushes it out instead of mixing with it. The lower end of the condenser from which the condensed vapor flows is thus kept at the lowest temperature possible.

Why is a worm condenser better than a straight one? Sometimes in case of a straight condenser the vapor passes through without touching the sides of the tube and without condensing. In a worm condenser the vapor is made to continually change its course and so come in contact with the cool tube.

EQUATIONS SHOWING THE CHEMICAL REACTIONS WHICH TAKE PLACE IN MAKING THE PREPARATIONS FOR WHICH THE PHARMACOPŒIA GIVES DIRECTIONS.

Dilute Hydriodic Acid.

$$\underset{\text{Potassium iodide}}{KI} + \underset{\text{Tartaric acid}}{H_2C_4H_4O_6} = \underset{\text{Hydriodic acid}}{HI} + \underset{\text{Potassium bitartrate}}{KHC_4H_4O_6}.$$

$$\underset{\substack{\text{Potassium}\\\text{hypophosphite}}}{KH_2PO_2} + \underset{\substack{\text{Tartaric}\\\text{acid}}}{H_2C_4H_4O_6} = \underset{\substack{\text{Hypophosphorous}\\\text{acid}}}{H_3PO_2} + \underset{\text{Potassium bitartrate}}{KHC_4H_4O_6}.$$

Dilute Hydrocyanic Acid.

$$\underset{\substack{\text{Silver}\\\text{cyanide}}}{AgCN} + \underset{\substack{\text{Hydrochloric}\\\text{acid}}}{HCl} = \underset{\substack{\text{Hydrocyanic}\\\text{acid}}}{HCN} + \underset{\substack{\text{Silver}\\\text{chloride}}}{AgCl}.$$

Nitrohydrochloric Acid.

$$\underset{\substack{\text{Nitric}\\\text{acid}}}{HNO_3} + \underset{\substack{\text{Hydrochloric}\\\text{acid}}}{3HCl} = \underset{\substack{\text{Nitrosyl monochloride}}}{NOCl} + \underset{\text{Chlorine}}{Cl_2} + \underset{\text{Water}}{2H_2O}.$$

$$\underset{\substack{\text{Nitric}\\\text{acid}}}{2HNO_3} + \underset{\substack{\text{Hydrochloric acid}}}{6HCl} = \underset{\substack{\text{Nitrosyl}\\\text{dichloride}}}{2NOCl_2} + \underset{\text{Chlorine}}{Cl_2} + \underset{\text{Water}}{4H_2O}.$$

Probably both reactions take place.

Aromatic Sulphuric Acid.

$$\underset{\text{Alcohol}}{C_2H_5OH} + \underset{\text{Sulphuric acid}}{H_2SO_4} = \underset{\text{Ethyl acid sulphate}}{C_2H_5HSO_4} + \underset{\text{Water}}{H_2O};$$

and also, to some extent,

$$\underset{\text{Alcohol}}{2C_2H_5OH} + \underset{\text{Sulphuric acid}}{H_2SO_4} = \underset{\text{Ether}}{(C_2H_5)_2O} + \underset{\text{Sulphuric acid}}{H_2SO_4} + \underset{\text{Water}}{H_2O}.$$

Sulphurous Acid.

$$\underset{\text{Sulphuric acid}}{4H_2SO_4} + \underset{\text{Carbon}}{C_2} = \underset{\text{Sulphur dioxide}}{4SO_2} + \underset{\text{Carbon dioxide}}{2CO_2} + \underset{\text{Water}}{4H_2O}.$$

Aluminum Hydroxide.

$$\underset{\text{Alum}}{Al_2K_2(SO_4)_4} + 3\underset{\text{Sodium carbonate}}{Na_2CO_3} + \underset{\text{Water}}{3H_2O} =$$

$$\underset{\text{Aluminum hydroxide}}{2Al(OH)_3} + \underset{\text{Potassium sulphate}}{K_2SO_4} + \underset{\text{Sodium sulphate}}{3Na_2SO_4} + \underset{\text{Carbon dioxide}}{3CO_2}.$$

Fused Silver Nitrate.

$$\underset{\text{Silver nitrate}}{AgNO_3} + \underset{\text{Hydrochloric acid}}{HCl} = \underset{\text{Silver chloride}}{AgCl} + \underset{\text{Nitric acid}}{HNO_3}.$$

Bismuth Citrate.

$$\underset{\text{Bismuth subnitrate}}{BiONO_3} + \underset{\text{Citric acid}}{H_3C_6H_5O_7} = \underset{\text{Bismuth citrate}}{BiC_6H_5O_7} + \underset{\text{Nitric acid}}{HNO_3} + \underset{\text{Water}}{H_2O}.$$

Sulphurated Lime.

$$\underset{\text{Calcium sulphate}}{CaSO_4} + \underset{\text{Carbon}}{3C} = \underset{\text{Calcium sulphide}}{CaS} + \underset{\text{Carbon monoxide}}{2CO} + \underset{\text{Carbon dioxide}}{CO_2}.$$

Purified Animal Charcoal.

$$\underset{\text{Calcium phosphate}}{Ca_3(PO_4)_2} + \underset{\text{Hydrochloric acid}}{4HCl} = \underset{\text{Calcium acid phosphate}}{Ca(H_2PO_4)_2} + \underset{\text{Calcium chloride}}{2CaCl_2}$$

and

$$\underset{\text{Calcium carbonate}}{CaCO_3} + \underset{\text{Hydrochloric acid}}{2HCl} = \underset{\text{Calcium chloride}}{CaCl_2} + \underset{\text{Carbon dioxide}}{CO_2} + \underset{\text{Water}}{H_2O}.$$

Lead Plaster.

$$\underset{\text{Sodium oleate}}{2NaC_{18}H_{33}O_2} + \underset{\text{Lead acetate}}{Pb(C_2H_3O_2)_2} =$$

$$\underset{\text{Lead oleate}}{Pb(C_{18}H_{33}O_2)_2} + \underset{\text{Sodium acetate}}{2NaC_2H_3O_2}.$$

Saccharated Carbonate of Iron.

$$\underset{\text{Ferrous sulphate}}{FeSO_4} + \underset{\text{Sodium bicarbonate}}{2NaHCO_3} = \underset{\text{Ferrous carbonate}}{FeCO_3} + \underset{\text{Sodium sulphate}}{Na_2SO_4} + \underset{\text{Carbon dioxide}}{CO_2} + \underset{\text{Water}}{H_2O}.$$

Ferric Hydroxide.

$$\underset{\text{Ferric sulphate}}{Fe_2(SO_4)_3} + \underset{\text{Ammonia}}{6NH_4OH} = \underset{\text{Ferric hydroxide}}{2Fe(OH)_3} + \underset{\text{Ammonium sulphate}}{3(NH_4)_2SO_4}.$$

Glycerite of Boroglycerin.

$$\underset{\text{Glycerin}}{C_3H_5(OH)_3} + \underset{\text{Boric acid}}{H_3BO_3} = \underset{\text{Glyceryl borate}}{C_3H_5BO_3} + \underset{\text{Water}}{3H_2O}.$$

Yellow Iodide of Mercury.

$$\underset{\text{Mercury}}{3Hg} + \underset{\text{Nitric acid}}{4HNO_3} = \underset{\text{Mercurous nitrate}}{3HgNO_3} + \underset{\text{Nitric oxide}}{NO} + \underset{\text{Water}}{2H_2O}.$$

$$\underset{\text{Mercurous nitrate}}{HgNO_3} + \underset{\text{Potassium iodide}}{KI} = \underset{\text{Mercurous iodide}}{HgI} + \underset{\text{Potassium iodide}}{KNO_3}.$$

If potassium iodide is in excess the following reactions take place:

$$\underset{\text{Mercurous iodide}}{2HgI} + \underset{\text{Potassium iodide}}{KI} = \underset{\text{Mercury}}{Hg} + \underset{\text{Mercuric iodide}}{HgI_2} + \underset{\text{Potassium iodide}}{KI}.$$

$$\underset{\text{Mercuric iodide}}{HgI_2} + \underset{\text{Potassium iodide}}{2KI} = \underset{\text{Potassium mercuric iodide}}{HgI_2 \cdot 2KI}.$$

Red Iodide of Mercury.

$$\underset{\text{Mercuric chloride}}{HgCl_2} + \underset{\text{Potassium iodide}}{2KI} = \underset{\text{Mercuric iodide}}{HgI_2} + \underset{\text{Potassium chloride}}{2KCl}.$$

$$\underset{\text{Mercuric iodide}}{HgI_2} + \underset{\text{Potassium iodide}}{2KI} = \underset{\text{Potassium mercuric iodide}}{HgI_2 \cdot 2KI}.$$

$$\underset{\text{Mercuric chloride}}{3HgCl_2} + \underset{\text{Potassium iodide}}{2KI} = \underset{\text{Mercuric iodochloride}}{HgI_2 \cdot 2HgCl_2} + \underset{\text{Potassium chloride}}{2KCl}.$$

If too much potassium iodide is used the second reaction takes place, and if the mercuric chloride is in excess the last reaction takes place.

Yellow Oxide of Mercury.

$$\underset{\text{Mercuric chloride}}{HgCl_2} + \underset{\text{Sodium hydroxide}}{2NaOH} = \underset{\text{Mercuric oxide}}{HgO} + \underset{\text{Sodium chloride}}{2NaCl} + \underset{\text{Water}}{H_2O}.$$

$$\underset{\text{Mercuric chloride}}{4HgCl_2} + 6NaOH = \underset{\text{Basic mercuric chloride}}{HgCl_2 \cdot 3HgO} + \underset{\text{Sodium chloride}}{6NaCl} + \underset{\text{Water}}{3H_2O},$$

if $HgCl_2$ is in excess.

Ammoniated Mercury.

$$\underset{\text{Mercuric chloride}}{HgCl_2} + \underset{\text{Ammonia}}{2NH_4OH} = \underset{\text{Ammonium chloride}}{NH_4Cl} + \underset{\text{Ammoniated mercury}}{NH_2HgCl} + \underset{\text{Water}}{2H_2O}.$$

Infusion of Wild Cherry.

$$\underset{\text{Amygdalin}}{C_{20}H_{27}NO_{11}} + \underset{\text{Water}}{2H_2O} + \text{emulsin} =$$

$$\underset{\text{Glucose}}{2C_6H_{12}O_6} + \underset{\text{Hydrocyanic acid}}{HCN} + \underset{\text{Benzaldehyde}}{C_6H_5COH} + \text{emulsin}.$$

Ammonia Liniment.

$$\underset{\text{Olein}}{C_3H_5(C_{18}H_{33}O_2)_3} + \underset{\text{Ammonia}}{3NH_4OH} =$$

$$\underset{\text{Ammonium oleate}}{3NH_4C_{18}H_{33}O_2} + \underset{\text{Glycerin}}{C_3H_5(OH)_3},$$

and

$$\underset{\text{Oleic acid}}{HC_{18}H_{33}O_2} + \underset{\text{Ammonia}}{NH_4OH} = \underset{\text{Ammonium oleate}}{NH_4C_{18}H_{33}O_2} + \underset{\text{Water}}{H_2O}.$$

Solution of Arsenous Acid.

$$\underset{\text{Arsenous oxide}}{As_2O_3} + \underset{\text{Water}}{3H_2O} = \underset{\text{Arsenous acid}}{2H_3AsO_3}.$$

Solution of Ammonium Acetate.

$$\underset{\substack{\text{Ammonium bicarbonate}\\ \text{and carbamate}}}{NH_4HCO_3 \cdot NH_4NH_2CO_2} + \underset{\text{Acetic acid}}{3HC_2H_3O_2} =$$

$$\underset{\text{Ammonium acetate}}{3NH_4C_2H_3O_2} + \underset{\text{Carbon dioxide}}{2CO_2} + \underset{\text{Water}}{H_2O}.$$

Solution of Lime.

$$\underset{\text{Lime}}{CaO} + \underset{\text{Water}}{H_2O} = \underset{\text{Calcium hydroxide}}{Ca(OH)_2}.$$

Compound Solution of Chlorine.

$$\underset{\substack{\text{Potassium}\\ \text{chlorate}}}{KClO_3} + \underset{\substack{\text{Hydrochloric}\\ \text{acid}}}{6HCl} = \underset{\substack{\text{Potassium}\\ \text{chloride}}}{KCl} + \underset{\text{Chlorine}}{3Cl_2} + \underset{\text{Water}}{3H_2O},$$

and

$$\underset{\substack{\text{Potassium}\\ \text{chlorate}}}{2KClO_3} + \underset{\substack{\text{Hydrochloric}\\ \text{acid}}}{4HCl} = \underset{\substack{\text{Potassium}\\ \text{chloride}}}{2KCl} + \underset{\substack{\text{Chlorine}\\ \text{peroxide}}}{2ClO_2} + \underset{\text{Chlorine}}{Cl_2} + \underset{\text{Water}}{2H_2O}.$$

Solution of Ferric Chloride.

$$\underset{\text{Iron}}{Fe} + \underset{\substack{\text{Hydro-}\\ \text{chloric acid}}}{2HCl} = \underset{\substack{\text{Ferrous}\\ \text{chloride}}}{FeCl_2} + \underset{\text{Hydrogen}}{H_2}.$$

$$\underset{\substack{\text{Ferrous}\\ \text{chloride}}}{3FeCl_2} + \underset{\substack{\text{Nitric}\\ \text{acid}}}{HNO_3} + \underset{\substack{\text{Hydro-}\\ \text{chloric acid}}}{3HCl} = \underset{\substack{\text{Ferric}\\ \text{chloride}}}{3FeCl_3} + \underset{\substack{\text{Nitric}\\ \text{oxide}}}{NO} + \underset{\text{Water}}{2H_2O}.$$

Solution of Iron and Ammonium Acetate.

$$\underset{\substack{\text{Ferric}\\ \text{chloride}}}{FeCl_3} + \underset{\substack{\text{Ammonium}\\ \text{acetate}}}{3NH_4C_2H_3O_2} = \underset{\substack{\text{Ferric}\\ \text{acetate}}}{Fe(C_2H_3O_2)_3} + \underset{\substack{\text{Ammonium}\\ \text{chloride}}}{3NH_4Cl}.$$

(To some extent.)

Solution of Ferric Subsulphate.

$$12FeSO_4 + 3H_2SO_4 + 4HNO_3 =$$

Ferrous sulphate — Sulphuric acid — Nitric acid

$$3Fe_4O(SO_4)_5 + 4NO + 5H_2O.$$

Ferric subsulphate — Nitric oxide — Water

Solution of Ferric Sulphate.

$$6FeSO_4 + 3H_2SO_4 + 2HNO_3 =$$

Ferrous sulphate — Sulphuric acid — Nitric acid

$$3Fe_2(SO_4)_3 + 2NO + 4H_2O.$$

Ferric sulphate — Nitric oxide — Water

Solution of Mercuric Nitrate.

$$HgO + 2HNO_3 = Hg(NO_3)_2 + H_2O.$$

Mercuric oxide — Nitric acid — Mercuric nitrate — Water

Solution of Magnesium Citrate.

$$4MgCO_3 \cdot Mg(OH)_2 + 5H_3C_6H_5O_7 =$$

Magnesium carbonate — Citric acid

$$5MgHC_6H_5O_7 + 4CO_2 + 6H_2O.$$

Magnesium acid citrate — Carbon dioxide — Water

$$2KHCO_3 + H_3C_6H_5O_7 = K_2HC_6H_5O_7 + 2CO_2 + 2H_2O.$$

Potassium bicarbonate — Citric acid — Potassium acid citrate — Carbon dioxide — Water

(Probably).

Solution of Lead Subacetate.

$$\underset{\text{Lead acetate}}{Pb(C_2H_3O_2)_2} + \underset{\text{Lead oxide}}{PbO} = \underset{\text{Lead sub-acetate}}{Pb_2O(C_2H_3O_2)_2}.$$

Solution of Potassium Arsenite.

$$\underset{\text{Arsenous oxide}}{As_2O_3} + \underset{\text{Potassium bicarbonate}}{4KHCO_3} = \underset{\text{Potassium acid arsenite}}{2K_2HAsO_3} + \underset{\text{Water}}{H_2O} + \underset{\text{Carbon dioxide}}{4CO_2};$$

or,

$$\underset{\text{Arsenous oxide}}{As_2O_3} + \underset{\text{Potassium bicarbonate}}{2KHCO_3} + \underset{\text{Water}}{H_2O} = \underset{\text{Potassium acid arsenite}}{2KH_2AsO_3} + \underset{\text{Carbon dioxide}}{2CO_2};$$

or,

$$\underset{\text{Arsenous oxide}}{As_2O_3} + \underset{\text{Potassium bicarbonate}}{2KHCO_3} = \underset{\text{Potassium met-arsenite}}{2KAsO_2} + \underset{\text{Water}}{H_2O} + \underset{\text{Carbon dioxide}}{2CO_2};$$

and

$$\underset{\text{Potassium bicarbonate}}{2KHCO_3} + \text{boiling} = \underset{\text{Potassium carbonate}}{K_2CO_3} + \underset{\text{Water}}{H_2O} + \underset{\text{Carbon dioxide}}{CO_2}.$$

It is not definitely known which of the first three reactions take place. The solution is alkaline from the potassium carbonate formed.

Solution of Potassium Citrate.

$$\underset{\text{Potassium bicarbonate}}{3KHCO_3} + \underset{\text{Citric acid}}{H_3C_6H_5O_7} = \underset{\text{Potassium citrate}}{K_3C_6H_5O_7} + \underset{\text{Water}}{3H_2O} + \underset{\text{Carbon dioxide}}{3CO_2}.$$

Solution of Chlorinated Soda.

$$\underset{\text{Calcium hypochlorite}}{Ca(OCl)_2} + \underset{\text{Calcium chloride}}{CaCl_2} + \underset{\text{Sodium carbonate}}{2Na_2CO_3} =$$

$$\underset{\text{Sodium hypochlorite}}{2NaOCl} + \underset{\text{Sodium chloride}}{2NaCl} + \underset{\text{Calcium carbonate}}{2CaCO_3}.$$

Solution of Zinc Chloride.

$$\underset{\text{Zinc}}{Zn} + \underset{\text{Hydrochloric acid}}{2HCl} = \underset{\text{Zinc chloride}}{ZnCl_2} + \underset{\text{Hydrogen}}{H_2}.$$

$$\underset{\text{Iron}}{Fe} + \underset{\text{Hydrochloric acid}}{2HCl} = \underset{\text{Ferrous chloride}}{FeCl_2} + \underset{\text{Hydrogen}}{H_2}.$$

$$\underset{\text{Ferrous chloride}}{3FeCl_2} + \underset{\text{Hydrochloric acid}}{3HCl} + \underset{\text{Nitric acid}}{HNO_3} = \underset{\text{Ferric chloride}}{3FeCl_3} + \underset{\text{Nitric oxide}}{NO} + \underset{\text{Water}}{2H_2O}.$$

$$\underset{\text{Ferric chloride}}{2FeCl_3} + \underset{\text{Zinc carbonate}}{3ZnCO_3} + \underset{\text{Water}}{3H_2O} = \underset{\text{Ferric hydroxide}}{2Fe(OH)_3} + \underset{\text{Zinc chloride}}{3ZnCl_2} + \underset{\text{Carbon dioxide}}{3CO_2}.$$

The last three reactions take place if iron is present as an impurity.

Precipitated Manganese Dioxide.

$$\underset{\text{Manganese sulphate}}{MnSO_4} + \underset{\text{Ammonia}}{2NH_4OH} + \underset{\text{Hydrogen dioxide}}{H_2O_2} =$$

$$\underset{\text{Manganese dioxide}}{MnO_2} + \underset{\text{Ammonium sulphate}}{(NH_4)_2SO_4} + \underset{\text{Water}}{2H_2O}.$$

Mass of Ferrous Carbonate.

$$\underset{\text{Ferrous sulphate}}{FeSO_4} + \underset{\text{Sodium carbonate}}{Na_2CO_3} = \underset{\text{Ferrous carbonate}}{FeCO_3} + \underset{\text{Sodium sulphate}}{Na_2SO_4}.$$

Compound Iron Mixture.

$$\underset{\text{Ferrous sulphate}}{FeSO_4} + \underset{\text{Potassium carbonate}}{K_2CO_3} = \underset{\text{Ferrous carbonate}}{FeCO_3} + \underset{\text{Potassium sulphate}}{K_2SO_4}.$$

Resin in myrrh + Potassium carbonate =
Resin soap + Carbon dioxide.

Mixture of Rhubarb and Soda.

Resin in rhubarb + Sodium bicarbonate =
Resin soap + Carbon dioxide.

Oleate of Atropine.

$$\underset{\text{Atropine}}{C_{17}H_{23}NO_3} + \underset{\text{Oleic acid}}{HC_{18}H_{33}O_2} = \underset{\text{Atropine oleate}}{C_{17}H_{23}NO_3HC_{18}H_{33}O_2}.$$

Oleate of Mercury.

$$\underset{\text{Mercuric oxide}}{HgO} + \underset{\text{Oleic acid}}{2HC_{18}H_{33}O_2} = \underset{\text{Mercuric oleate}}{Hg(C_{18}H_{33}O_2)_2} + \underset{\text{Water}}{H_2O}.$$

Pills of Carbonate of Iron.

$$\underset{\text{Ferrous sulphate}}{FeSO_4} + \underset{\text{Potassium carbonate}}{K_2CO_3} = \underset{\text{Ferrous carbonate}}{FeCO_3} + \underset{\text{Potassium sulphate}}{K_2SO_4}.$$

Pills of Iodide of Iron.

$$\underset{\text{Iron}}{Fe} + \underset{\text{Iodine}}{I_2} = \underset{\text{Ferrous iodide}}{FeI_2}.$$

Compound Effervescing Powder.

$$\underset{\text{Sodium bicarbonate}}{2NaHCO_3} + \underset{\text{Tartaric acid}}{H_2C_4H_4O_6} = \underset{\text{Sodium tartrate}}{Na_2C_4H_4O_6} + \underset{\text{Carbon dioxide}}{2CO_2} + \underset{\text{Water}}{2H_2O}.$$

Spirit of Nitrous Ether.

$$\underset{\text{Sodium nitrite}}{2NaNO_2} + \underset{\text{Sulphuric acid}}{H_2SO_4} = \underset{\text{Sodium sulphate}}{Na_2SO_4} + \underset{\text{Nitrous acid}}{2HNO_2}.$$

$$\underset{\text{Alcohol}}{C_2H_5OH} + \underset{\text{Nitrous acid}}{HNO_2} = \underset{\text{Ethyl nitrite}}{C_2H_5NO_2} + \underset{\text{Water}}{H_2O}.$$

Aromatic Spirit of Ammonia.

$$\underset{\text{Ammonium bicarbonate and carbamate}}{NH_4HCO_3 \cdot NH_4NH_2CO_2} + \underset{\text{Ammonia}}{NH_4OH} = \underset{\text{Ammonium carbonate}}{2(NH_4)_2CO_3}.$$

Iodide of Sulphur.

$$\underset{\text{Iodine}}{I_2} + \underset{\text{Sulphur}}{S_2} = \underset{\text{Iodide of sulphur}}{I_2S_2}.$$

Washed Sulphur.

$$\underset{\text{Sulphuric acid}}{H_2SO_4} + \underset{\text{Ammonia}}{2NH_4OH} = \underset{\text{Ammonium sulphate}}{(NH_4)_2SO_4} + \underset{\text{Water}}{2H_2O}.$$

$$\underset{\text{Arsenous sulphide}}{As_2S_3} + 6\underset{\text{Ammonia}}{NH_4OH} = \underset{\text{Ammonium arsenite}}{(NH_4)_3AsO_3} + \underset{\text{Ammonium sulpharsenite}}{(NH_4)_3AsS_3} + \underset{\text{Water}}{3HO}.$$

Precipitated Sulphur.

$$\underset{\text{Lime}}{CaO} + \underset{\text{Water}}{H_2O} = \underset{\text{Calcium hydroxide}}{Ca(OH)_2}.$$

$$\underset{\text{Calcium hydroxide}}{3Ca(OH)_2} + \underset{\text{Sulphur}}{12S} = \underset{\text{Calcium pentasulphide}}{2CaS_5} + \underset{\text{Calcium thiosulphate}}{CaS_2O_3} + \underset{\text{Water}}{3H_2O}.$$

$$2As_2S_3 + 6Ca(OH)_2 = Ca_3(AsO_3)_2 + Ca_3(AsS_3)_2 + 6H_2O.$$

Arsenous sulphide — Calcium hydroxide — Calcium arsenite — Calcium sulph-arsenite — Water

$$CaS_5 + 2HCl = CaCl_2 + 4S + H_2S.$$

Calcium penta-sulphide — Hydro-chloric acid — Calcium chloride — Sulphur — Hydrogen sulphide

Glycerin Suppositories.

$$Na_2CO_3 + 2HC_{18}H_{35}O_2 = 2NaC_{18}H_{35}O_2 + CO_2 + H_2O.$$

Sodium carbonate — Stearic acid — Sodium stearate — Carbon dioxide — Water

Syrup Calcium Lactophosphate.

$$CaCO_3 + 2HC_3H_5O_3 = Ca(C_3H_5O_3)_2 + CO_2 + H_2O.$$

Calcium carbonate — Lactic acid — Calcium lactate — Carbon dioxide — Water

$$Ca(C_3H_5O_3)_2 + H_3PO_4 = CaHPO_4 + 2HC_3H_5O_3.$$

Calcium lactate — Phosphoric acid — Calcium acid phosphate — Lactic acid

Syrup of Lime.

$$CaO + H_2O = Ca(HO)_2.$$

Lime — Water — Calcium hydroxide

Syrup Iodide of Iron.

$$Fe + I_2 = FeI_2.$$

Iron — Iodine — Ferrous iodide

Tincture of Ferric Chloride.

$$\underset{\text{Alcohol}}{C_2H_5OH} + \underset{\text{Hydrochloric acid}}{HCl} = \underset{\text{Ethyl chloride}}{C_2H_5Cl} + \underset{\text{Water}}{H_2O}, \text{ (probably).}$$

Ointment of Mercuric Nitrate.

$$\underset{\text{Mercury}}{3Hg} + \underset{\text{Nitric acid}}{8HNO_3} = \underset{\text{Mercuric nitrate}}{3Hg(NO_3)_2} + \underset{\text{Nitric oxide}}{2NO} + \underset{\text{Water}}{4H_2O}.$$

Lard + Nitric acid = Elaidin + Nitric oxide.

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